

January 2022 AR-VR 1st Edition

DUPONT

Tyvek®

* INDICATES INTERACTIVE IMAGE

Ctrl + scroll wheel on mouse to zoom

2022 Off-Site Manufacturing Modern Methods of Construction

Membranes, tapes, accessories and technical support



What do you want your project to achieve?

		Using Tyvek® and AirGuard®
Environmental Focus	Reduce waste, increase performance, extend durability	✓
Energy Efficiency	Save resources, energy and costs	✓
Air Quality	Reduce ingress of pollution into internal space	✓
Comfort	Increase internal building occupancy comfort	✓
Airtightness	Stop or reduce unintentional air leakage	✓
Durability	Extend life cycle performance of building	✓
Weather Proofing	Prevent water ingress, weather damage and provide wind tightness	✓

«DUPONT»
Tyvek®

«DUPONT»
AirGuard®

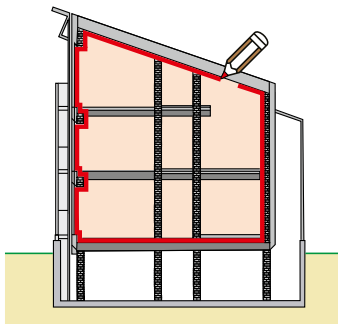
«DUPONT»
Insta Stik™

«DUPONT»
Froth-Pak™

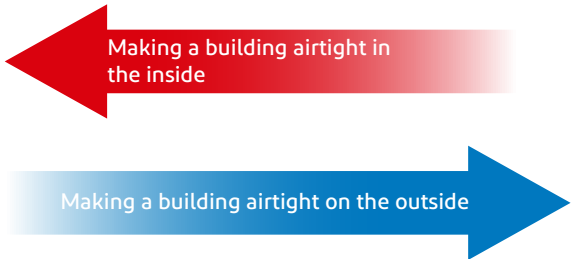
«DUPONT»
Great Stuff™

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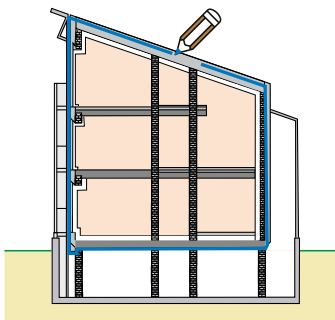
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Air and Vapour Control Layer Membranes (AVCL).



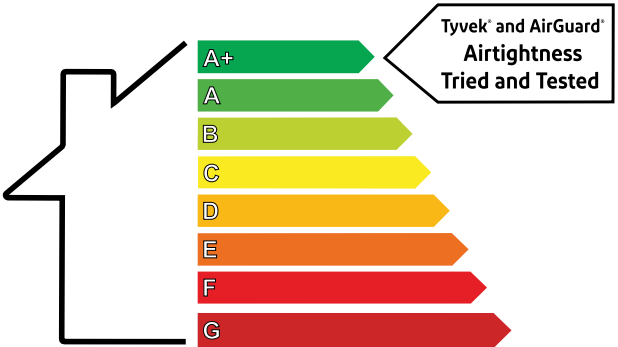
Working together, airtightness both inside and outside guarantees optimal results (A+, A)



Breather Membranes

Passive Energy Efficiency

Achieving good airtightness in the building envelope will simplify the process for the energy assessor, result in good SAP ratings and meaningful figures in the Energy Performance Certificate (EPC). Energy bills will be lower. We'll all have warm, comfortable buildings: homes, schools, hospitals and places of work. We'll also save energy and will probably add value to the building.



Product Portfolio

DuPont Performance Building Solutions

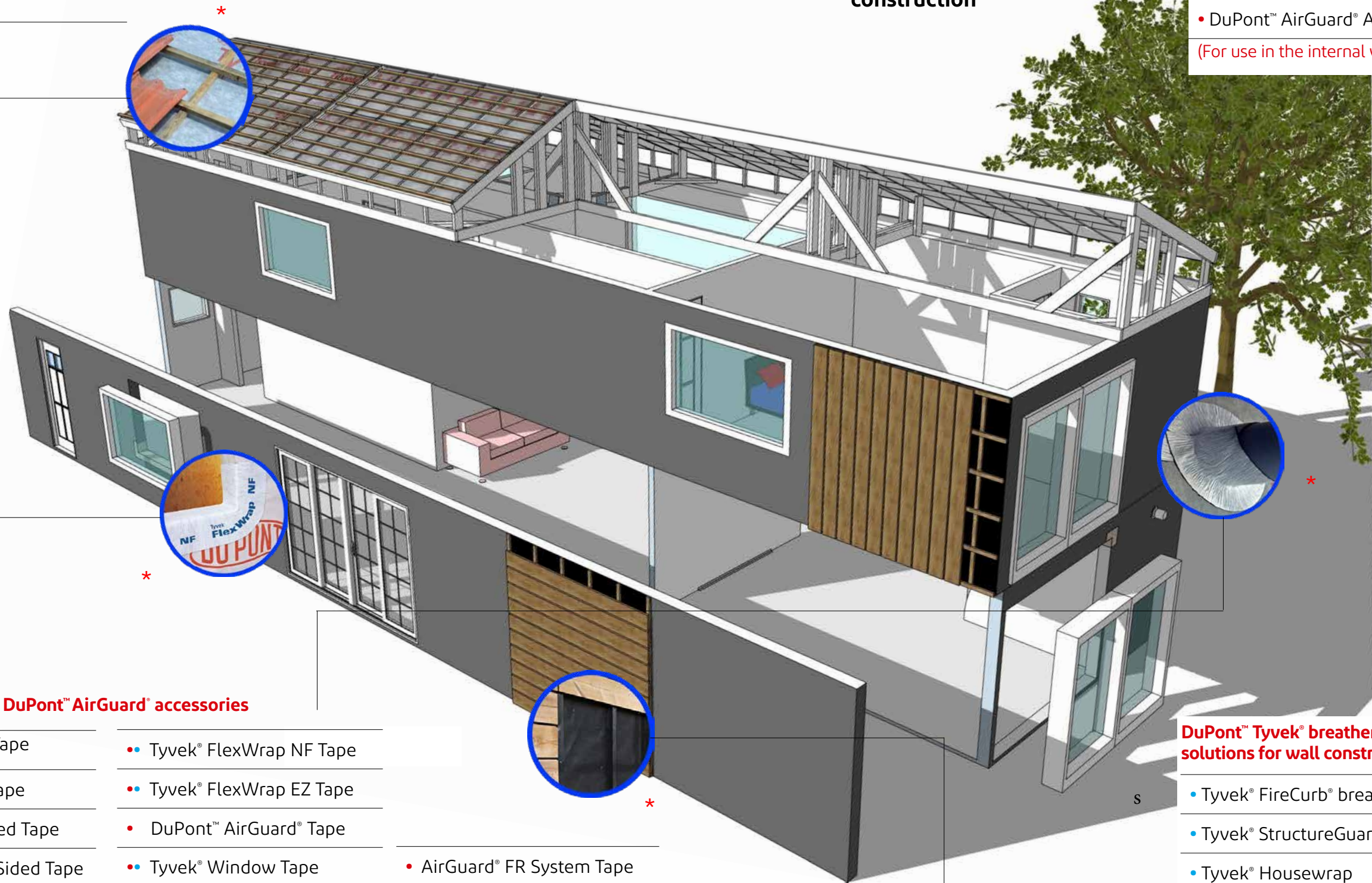
DuPont™ Tyvek® roofing underlays

- Tyvek® Supro / Tyvek® Supro Plus
- Tyvek® Metal

Products and Technical Support
for all Building Types from low
occupancy, low level buildings
to high occupancy, high rise
buildings, on-site and off-site
construction

DuPont™ AirGuard® air & vapour control layer
(AVCL) and DuPont™ Tyvek® AirGuard® Smart
(AVCL) membranes

- DuPont™ AirGuard® Control
- DuPont™ AirGuard® Reflective
- DuPont™ AirGuard® Reflective E
- DuPont™ Tyvek® AirGuard® Smart
- DuPont™ AirGuard® A2 FR fire retardant AVCL
(For use in the internal wall lining)



DuPont™ Tyvek® and DuPont™ AirGuard® accessories

- | | | |
|---|-----------------------------|----------------------------|
| • Tyvek® Acrylic Tape
with split-release liner | • Tyvek® FlexWrap NF Tape | • AirGuard® FR System Tape |
| • Tyvek® Acrylic Tape | • Tyvek® FlexWrap EZ Tape | • DuPont™ Insta Stik™ |
| • Tyvek® Metallised Tape | • DuPont™ AirGuard® Tape | • DuPont™ Great Stuff™ |
| • Tyvek® Double Sided Tape | • Tyvek® Window Tape | • DuPont™ Froth-Pak™ |
| • Tyvek® Butyl Tape | • DuPont™ AirGuard® Sealant | |
| • Tyvek® UV Façade Tape | • Tyvek® Primer | |

DuPont™ Tyvek® breather membranes solutions for wall constructions

- Tyvek® FireCurb® breather membrane
- Tyvek® StructureGuard™
- Tyvek® Housewrap
- Tyvek® Reflex
- Tyvek® UV Façade/Tyvek® UV Façade Plus
(For use in the external wall lining)

Case Study

Sustainability in the building industry.

**Student housing in Sweden:
Forta Pro modular solutions with DuPont™ Tyvek®
deliver energy efficiency and increase interior comfort.**

April 2021 – “Kvarteret Jylland” is a new student accommodation consisting of 350 micro-apartments, located in Kista, Northern Stockholm, Sweden. The project mission was to build modern, sustainable and attractive premises for young people.

The Kvarteret Jylland complex (7100 square metres, four buildings) was completed in a short amount of time by the Latvian-based company Forta Pro, that specialises in modular construction solutions based on energy efficiency and sustainability concepts. 178 modules were fabricated and installed. DuPont™ Tyvek® breather membranes and accessories have been used by Forta Pro for the building envelope to protect the construction from water, air and moisture and to increase the comfort and well-being of the students.



DuPont Performance Building Solutions have been a lead supplier of a wide range of products for the Off-site construction market for >25 years. Our technical Building Knowledge Centre team will be pleased to support you in this area to achieve the best building performance possible.



**THE DUPONT™ TYVEK®
BUILDING KNOWLEDGE CENTRE**
- Science you can build on -
www.building.dupont.co.uk
www.construction.tyvek.co.uk
www.energy-efficiency.dupont.com

The DuPont™ Tyvek® Building Knowledge Centre is a resource for building envelope installation and design best practices. It's a dedicated source for information about evolving building regulations, sustainable building practices and air, water and thermal management, that can help you:

- Select building envelope materials and techniques
- Meet or exceed building standards
- Enhance energy efficiency
- Protect interior air quality
- Improve building durability
- Increase job site efficiency
- Develop project-specific specifications and plans.

We also have a Technical Library which has all our data sheets, installation guides & certificates e.g. BBA, NSAI, CE...

You can contact the technical department by email or phone on:

Technical: +44 (0) 117 452 9052/9053
Sales: +44 (0) 117 452 9050
Technical E-mail: tyvek.construction@dupont.com

Case Study

Cornwall Timber Build

Open Panel Timber Frame manufactured off-site and completed on-site. Exposed coastal location requiring unrestricted W1 rated Tyvek® Reflex.



www.cornwalltimberbuild.co.uk

DuPont has over 220 years of product development experience

DuPont Performance Building Solutions:-

- For All types of Building
- Technical Support - detailed knowledge and experience
- Wide range of products - Membranes, Tapes and Accessories
- Heat, Air and Moisture Management
- Standards & Building Regulations
- Condensation risk calculations
- Airtightness - Air leakage safeguard
- Fire safety offering



BIM
BUILDING
INFORMATION
MODELLING

As part of our professional technical service we provide:

- Calculations e.g Condensation, U-Value...
- Training, Site visits and Hands on Toolbox Talks
- CPDs
- BIM library
- Desktop Design Reviews
- Plus many more types of support

<https://www.bimobject.com/en/product?brand=dp-tyvek>

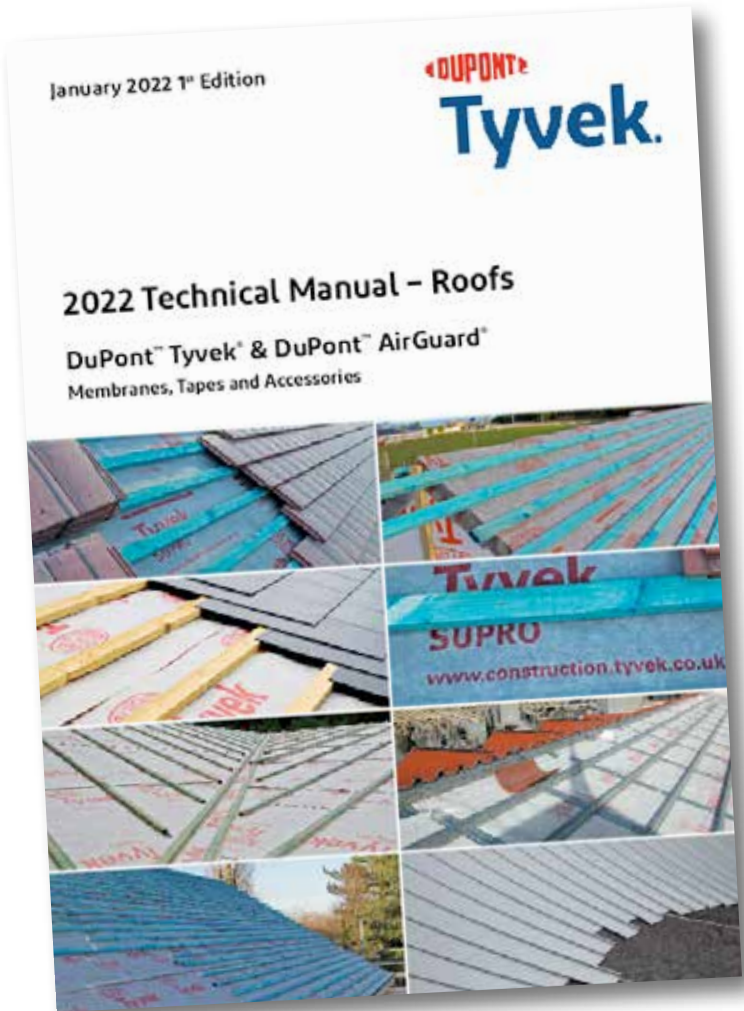


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www.energy-efficiency.dupont.com

Roofing Technical Manual

To find additional useful information on our membranes, tapes and accessories, for all building types, please see our latest Technical Manual, Roofs on our website www.building.dupont.co.uk



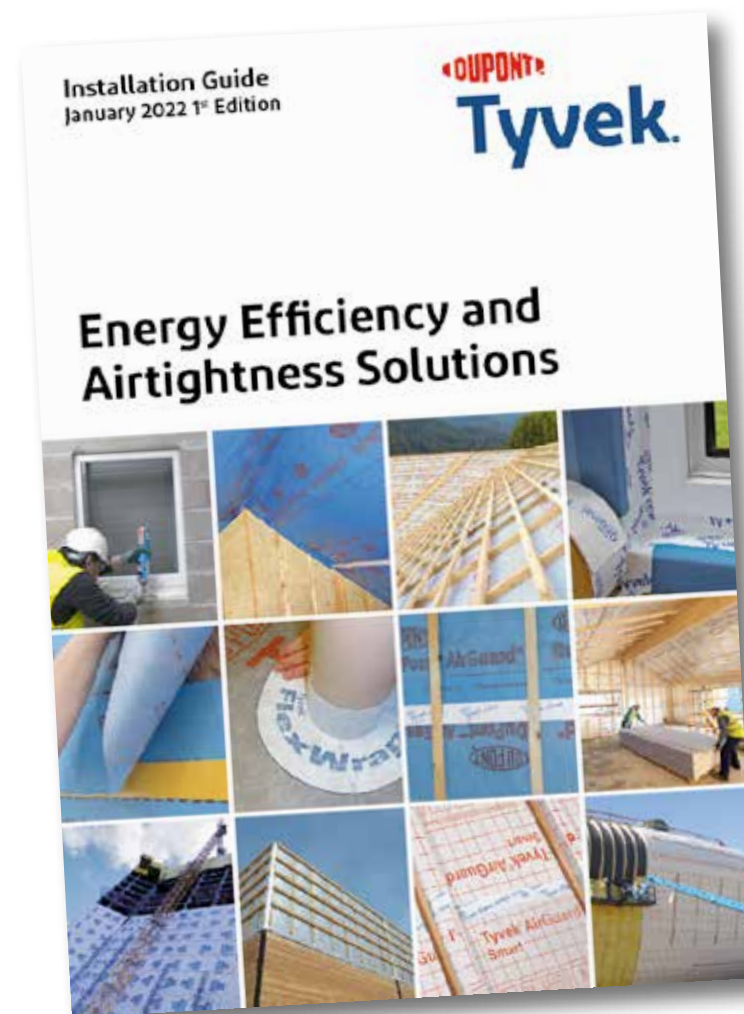
The Technical Manual - Roofs, the Installation Guide, Know-how videos, documentation and other information can be easily found on our following web sites: www.building.dupont.co.uk and www.energy-efficiency.dupont.com

If you would like to discuss your project with one of our technical experts please contact the DuPont™ Tyvek® Building Knowledge Centre in Bristol, UK Tel: +44 (0) 117 452 9052/9053; e-Mail: Tyvek.construction@dupont.com

Installation Guide

Plus helpful demonstration videos and product information. Please visit our website www.building.dupont.co.uk. Go to “documentation” header, then “Resource Centre” sub heading, then type in “Installation Guide” in the search space or type in “Technical Manual”.

To find additional useful information on our membranes, tapes and accessories, for all building types, please see our latest Installation Guide



The Installation Guide, Know-how videos, documentation and other information can be easily found on our following web sites: www.building.dupont.co.uk and www.energy-efficiency.dupont.com

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Off-Site Manufacturing/Modern Methods of Construction

Introduction

Over 30 years ago, the DuPont™ Tyvek® family of Weather Resistant Barrier (WRB) and superior building performance membranes were introduced into the UK and Ireland construction markets. The inherent qualities of the DuPont™ Tyvek®, range of products, made them an obvious solution in providing protection to buildings against the external elements, offering benefits over traditional materials in terms of water resistance, vapour permeability, flexibility, strength and durability.

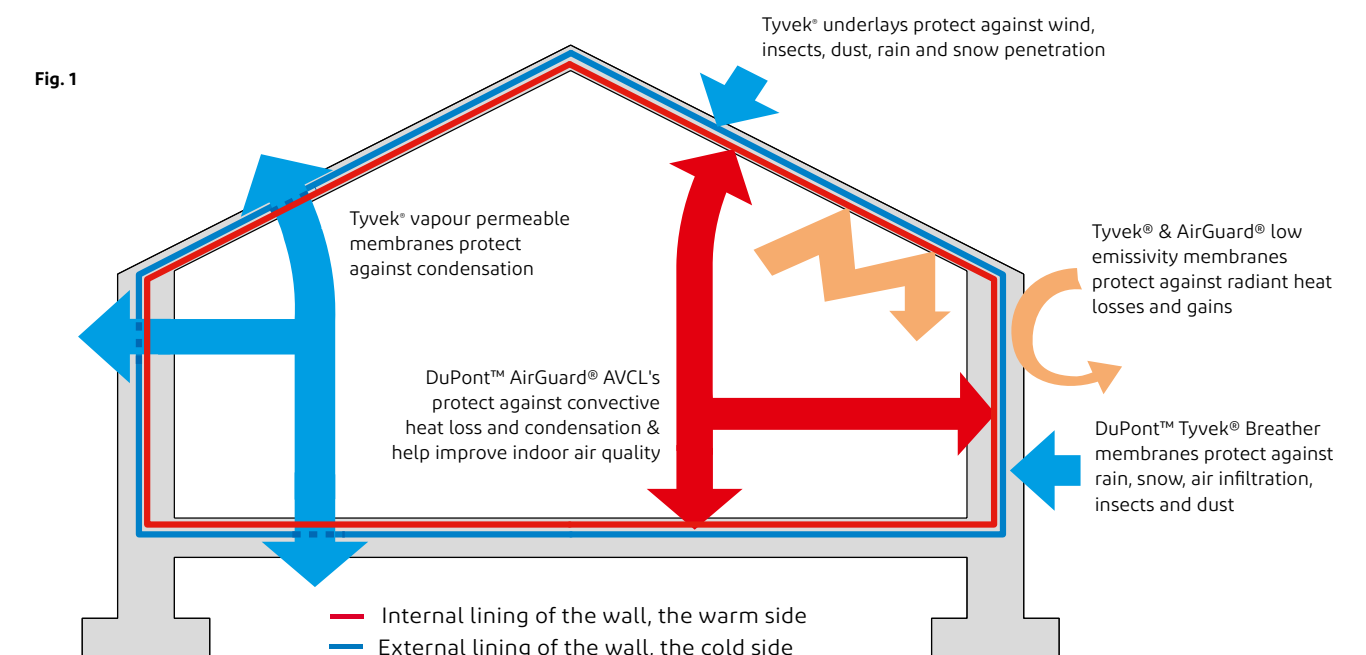
The DuPont™ Tyvek® product range was enhanced with the introduction of our internal DuPont™ AirGuard® membranes to control internal moisture and enhance energy efficiency. Together with a complete range of adhesive sealing tapes and accessories, the combined product portfolio has evolved to meet the demands of the changing world, providing solutions for the following:

- Weather Protection
- Moisture & Condensation Control
- Energy Efficiency & Airtightness
- Indoor Air Quality
- Thermal Performance
- Fire Safety
- Long Term Durability

Protection in Construction

This technical manual contains detailed information specifically on the use of Tyvek® and AirGuard® membranes in modular and other off-site construction. By controlling the movements of heat, air and moisture through the building envelope DuPont™ Tyvek® and DuPont™ AirGuard® membranes can make a major contribution to protecting the environment by improving the energy efficiency of buildings.

To achieve the required internal conditions with optimum efficiency it is essential to consider air flow and moisture movement together with all aspects of heat transfer, not only by conduction, but also by convection and radiation. The reduction of air leakage, the avoidance of damaging condensation and the provision of thermal insulation must all be considered together to ensure the protection and well-being of the occupants and the long-term protection of the building fabric.



For information on Tyvek® & AirGuard® membranes for protection against external moisture please contact the DuPont™ Tyvek® Building Knowledge Centre. Details on back page.

Case Study

SIP Panel project

Multi-floor Student Accommodation in exposed west coast site, manufactured and assembled during the winter using unrestricted W1 Tyvek® membrane to protect against moisture damage



www.buildingwithframes.co.uk



DuPont™ Tyvek® Breather Membranes

For external weather protection
and enhanced airtightness

- Tyvek® Housewrap
- Tyvek® FireCurb® breather membrane
- Tyvek® StructureGuard™
- Tyvek® Reflex
- Tyvek® UV Façade
- Tyvek® UV Façade Plus
- Tyvek® Supro
- Tyvek® Supro Plus

Useful step by step installation guides and videos are available from the DuPont™ Tyvek® Building Knowledge Centre and our web sites:

www.building.dupont.co.uk

www.energy-efficiency.dupont.com

Important:- All building regulations should be checked to ensure compliance, especially with respect to fire performance

Framed wall construction (SFS & Timber)

A framed wall element, such as a timber or steel frame system, is by and large a discontinuous method of construction. This makes them potentially vulnerable to external moisture and therefore must have continuous external protection layers. Some external cladding components, such as brick and block offer a limited level of defense against the elements, even though they are sometimes regarded as effective primary water shedding layers. Rainscreen systems however very often incorporate lapped or jointed external cladding where moisture ingress is likely, especially in exposed locations.

In both cases however, a back-up against moisture ingress is necessary, but the component used must be vapour-open to prevent condensation occurring within the wall element. A breather membrane has long been accepted as a means of providing this function in many types of wall system and has evolved over time to arrive at the hi-tech Tyvek® and AirGuard® membranes we have today.

DuPont™ Tyvek® breather membranes for wall construction:

Tyvek® Housewrap	Superior Tyvek® Lightweight Membrane
Tyvek® FireCurb®	Class B Fire-rated lightweight membrane
Tyvek® Reflex	Heat reflective/low emissivity membrane
Tyvek® UV Facade	Black, UV resistant membrane for open jointed cladding systems
Tyvek® StructureGuard™	Lightweight membrane for commercial projects Airtightness conduit for intermediate timber floors
Tyvek® Supro	Reinforced heavyweight membrane

All the DuPont™Tyvek® membranes listed here are lightweight flexible sheet materials suitable for use as breather membranes in various forms of wall construction. Manufactured from high density polyethylene DuPont™Tyvek® membranes are extremely durable and may be incorporated into new-build, refurbishment or extension projects

Specifying a suitable membrane

A breather membrane very often provides the solution to satisfying the moisture protection requirements of regional building regulations. As with all construction products, breather membranes must be classified in accordance with the relevant technical standard to demonstrate that they are suitable.

The relevant technical standard for breather membranes is EN 13859-2: 2014 - Underlays for Walls

The Construction Products Regulations 2013 require manufacturers to make DOP & CE datasheets freely available, in order to demonstrate compliance with EN13859-2.

All DuPont™Tyvek® wall membranes exceed the underlay classification document EN13859-2, which sets out the basic requirements for breather membranes used in wall systems. This standard replaced the previous document BS4016, where DuPont™Tyvek® membranes fell within the higher Type 1 breather membrane category. The current European Standard classifies breather membranes according to their measured water resistance, in conjunction with vapour transmission (Sd), strength and long-term durability. These represent the basic functions of a breather membrane.

EN 13859-2:2014 - Underlay classification (Wall membranes)

Class W1	Water tightness:	200mm (to EN 1928) Zero water leakage allowed	Test Conditions Heat ageing: 70°C (EN 1296) UV ageing: 2 weeks UV-A, Q Panel at 12°C (EN1297) Air Permeability: m3/m2/hour at 50 Pa (EN 12114)
Class W2	Water tightness:	50mm (to EN 13111) with leakage	
Class W3	Water tightness:	No requirement	

GOOD PRACTICE:- W3 UNSUITABLE FOR CONSTRUCTION. WE ALWAYS RECOMMEND W1.

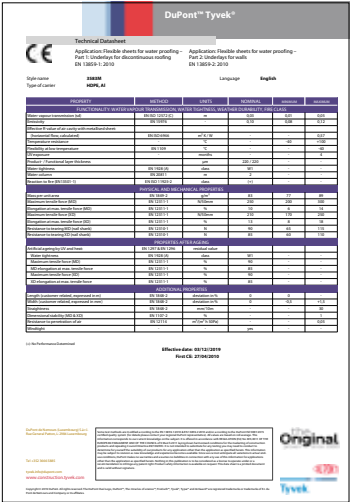
Class	Water Tightness EN 1928	MVTR (sd) EN ISO 12572	Tensile Strength EN12311-1	Tensile loss aged EN12311-1
A	W1	0.03m	>200 N/50mm	-25%
B	W1	0.03m	>100 N/50mm	-35%
C	W2	0.12m	>100 N/50mm	-50%

DuPont™Tyvek® membranes exceed the W1 classification to EN 13859-2:2014

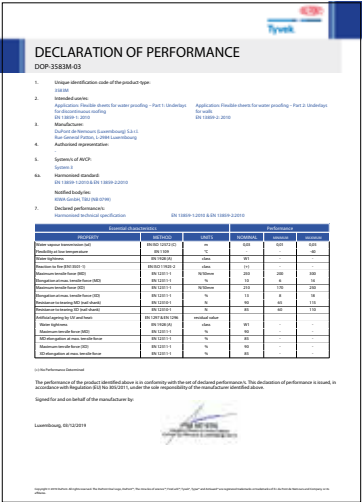
Any product or layer that is used in a wall construction for the critical function of providing protection against external moisture, should have at least Class W1 water resistance. This level should be regarded as an absolute minimum if adequate weather protection is to be achieved. This is now also endorsed by the Structural Timber Association (STA Advice Note 18), which brings together the requirements of Building Regulations, TRADA and NHBC. This highlights the importance of W1 membranes as timber is one of the more perishable materials.

Declarations of Performance & CE Marking

The Construction Products Regulations 2013 require manufacturers to make DOP & CE datasheets freely available, in order to demonstrate compliance with EN13859-2. This process ensures transparency and helps users and specifiers when selecting membranes for use in wall construction.



Example of CE Marking



Example of DoP



Breather Membrane Suitability Check

The following functional characteristics should be considered to determine whether a breather membrane is suitable for use in your project:



DuPont™Tyvek® membranes are suitable materials for use as breather membranes in lightweight framed wall constructions, both on-site and off-site.

Floor Constructions

Tyvek® membranes may also be installed into suspended floor constructions, providing a method of support to insulation as well as offering protection against external moisture, condensation and air infiltration.

Installation guidance for the use of Tyvek® membranes in floor constructions is given on pages 44-46.

Vapour Control

Wall constructions and suspended floors should be designed to limit the risk of harmful condensation occurring. This is especially important in respect of condensation that occurs unseen within the wall or floor element – also known as **Interstitial Condensation**. This can be achieved in 2 ways:

1. By ensuring that any moisture laden air within the wall or floor element can escape to external air. External layers positioned on the cold side of the insulation such as a breather membrane, should have a low vapour resistance (less than 0.6 MN.s/g or an SD of 0.12m).
2. By installing an internal membrane which helps to reduce vapour migration from the building interior through the wall or floor element. A membrane that is both vapour resistant and airtight will provide this function and is known as an **Air & Vapour Control Layer** (AVCL).

Airtightness

Air infiltration through gaps in the building fabric can accelerate the rate of heat loss due to convection and so reduce thermal performance. Both membranes mentioned above can help with airtightness, especially the internal AVCL with all joints sealed. Under the heading of 'air permeability' the various building regulations and standards that address energy efficiency require buildings to be efficient in terms of air-leakage. Achieving airtightness is equally important in both wall and floor construction.

Indoor Air Quality

In addition to energy efficiency, airtightness can be fundamental in improving Indoor Air Quality (IAQ). This is especially the case in heavily built up urban and city environments where the outside air may be polluted by road traffic or industry. In this case, it would be very important to achieve good levels of airtightness to help separate indoors from outdoors. Noise pollution would also be minimized with attention paid to the building fabric, insulation and effective sealing.

More information on airtightness and energy efficiency can be found in our Installation Guide for Energy Efficiency & Airtightness (see website for more details)

DuPont™ Tyvek® membranes wall applications

There are many different types of wall construction, most of which would benefit from the inclusion of a Tyvek® membrane. We have included some of the more common variations here as typical examples:

Product selector membrane applications

Tyvek® / AirGuard® membrane	Warm Pitched Roofs	Cold Pitched Roofs	Metal Clad & Industrial Roofs	Scottish boarded Roofs	Walls	Suspended floors
Breather Membranes (external)						
Tyvek® Supro	•	•	•	•	•	•
Tyvek® Supro Plus	•	•	•	•	•	•
Tyvek® Metal			•			
Tyvek® Housewrap					•	
Tyvek® FireCurb®					•	
Tyvek® StructureGuard™					•	
Tyvek® Reflex					•	
Tyvek® UV Facade					•	
Tyvek® UV Facade Plus					•	
Air & Vapour Control Layers (internal)						
DuPont™ AirGuard® A2 FR	•	•	•	•	•	•
DuPont™ Tyvek® AirGuard® Smart	•	•	•	•	•	
DuPont™ AirGuard® Control	•	•	•	•	•	•
DuPont™ AirGuard® Reflective	•	•	•	•	•	•
DuPont™ AirGuard® Reflective E	•	•	•	•	•	•

Fig. 1 Timber Frame *
Traditional
(bricks or brick slips)

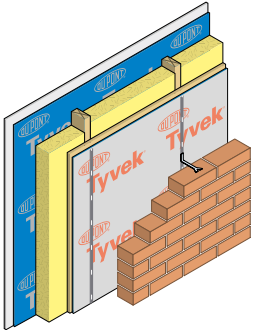


Fig. 2 Timber Frame *
Reverse construction)
Horizontal Weatherboarding

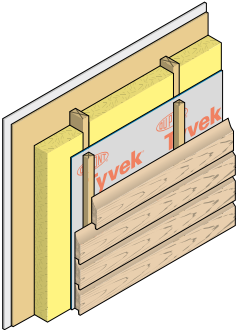


Fig. 3 Timber Frame *
Vertical weatherboarding

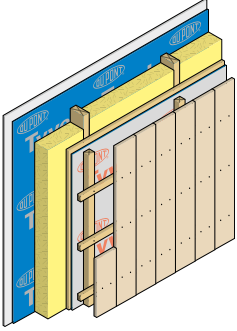


Fig. 4 Timber Frame *
Vertical slate/tile hanging

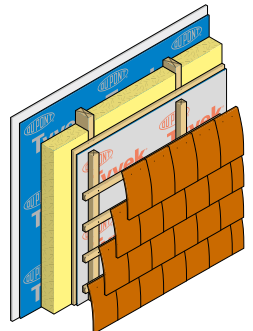


Fig. 5 Steel Frame *
Metal clad

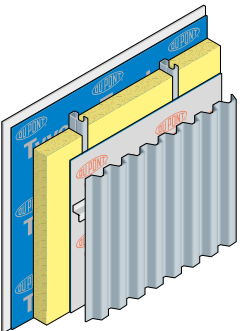


Fig. 6 Masonry Wall *
Internal insulation upgrade

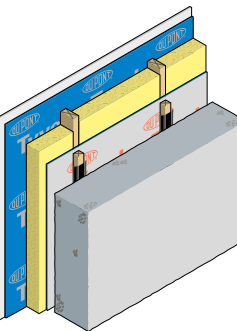


Fig. 7 Masonry Wall *
Metal clad

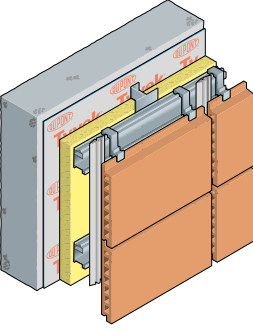


Fig. 8 Steel Frame *
Rainscreen cladding

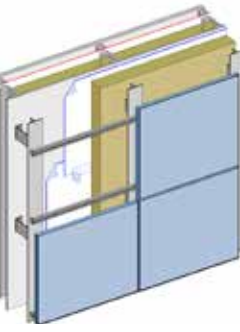
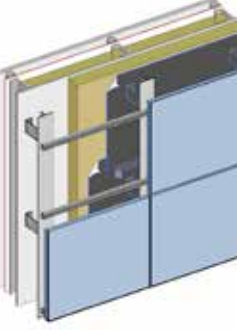


Fig. 9 Steel Frame *
Rainscreen cladding - open joints



Vertical battens over the breather membrane have been included in some details to ensure positive drainage of moisture. Although they may not always be required they are recommended particularly in areas subject to extremes of weather.

DuPont™ Tyvek® membranes in walls

The previous pages in this technical manual confirm the suitability of Tyvek® membranes in wall and floor applications. References to current legislative documents as well as approvals from the BBA further reinforce the message that the materials are 'fit for purpose' as breather membranes in wall constructions. In order to attain maximum benefit

from a Tyvek® membrane, both in terms of performance and warranty, it is important to ensure that correct installation procedures are followed. The following pages contain information on how best to install Tyvek® membranes in wall constructions. Although there are many construction variations the

basic principles for installation remain the same. Many of the details included here are regarded as standard practise in the timber frame industry, thus we have drawn upon the knowledge and experience of TRADA Technology in these instances.

Fire Performance

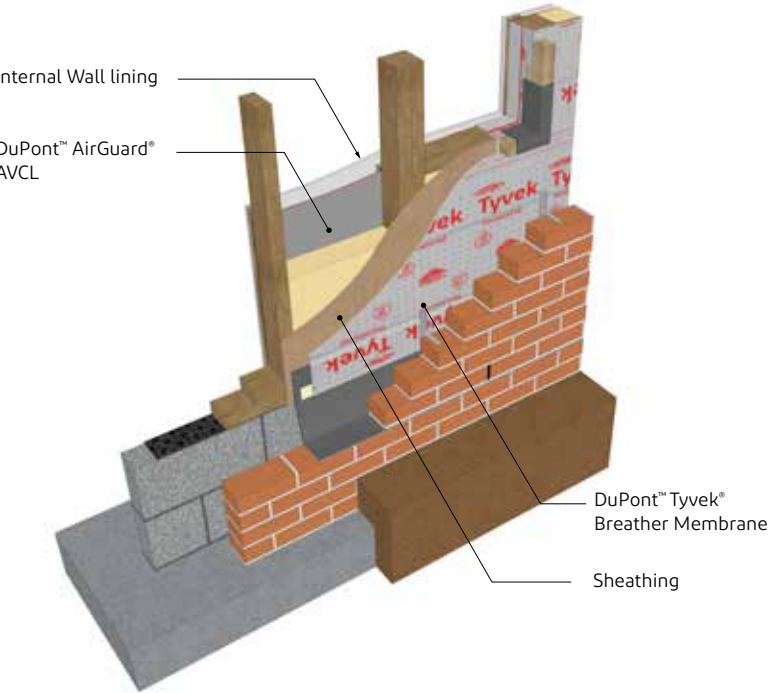
Attention must be paid to current fire regulations and standards, to ensure materials used in an external wall element meet the criteria for building height and proximity. Please also refer to page 46 for information on DuPont™ Tyvek® and DuPont™ AirGuard® fire performance products. For assistance on fire related projects please contact the DuPont™ Tyvek® Building Knowledge Centre (details at end of document)

Detailing - Framed Wall Construction

The external envelope of a timber frame wall system consists of two elements:

- The loadbearing timber frame wall
- The outer cladding. This may be a heavyweight cladding, supported independently by the foundations, or a lightweight cladding attached to the timber frame.

Fig. 12 - Typical timber frame wall brick cladding *



Suitable AirGuard® AVCL's
DuPont™ AirGuard® Reflective
DuPont™ AirGuard® Control
DuPont™ Tyvek® AirGuard® Smart
DuPont™ AirGuard® A2 FR

Suitable Tyvek® Membranes
DuPont™ Tyvek® Housewrap
DuPont™ Tyvek® FireCurb®
DuPont™ Tyvek® Reflex
DuPont™ Tyvek® StructureGuard™
DuPont™ Tyvek® Supro

Typical timber frame construction employs timber studs and rails, together with a wood based sheathing, to form a structural frame which transmits all horizontal and vertical loads to the foundations. The exterior cladding is non-loadbearing, although it may contribute to wind resistance; it is used to weather-proof the building and to provide the desired external appearance.

Although vapour permeable and moisture resistant sheathing boards are sometimes used, the sheathing is generally plywood or oriented strand board (OSB). The breather membrane is fixed to the sheathing to form a complete secondary protection layer.

External cladding

The external finish can vary greatly from a continuous brick or blockwork leaf to a discontinuous layer of vertical tile hanging or open jointed cladding. The type of cladding can sometimes determine the suitability of the breather membrane to specify, as with Tyvek UV Facade (see pages 16/17)

Steel frame (SFS)

A steel frame system is constructed in a very similar way to its timber counterpart. The build-up may include a cement, gypsum or calcium silicate board instead of a ply or OSB sheathing, but the choice of Tyvek breather membrane would be the same.

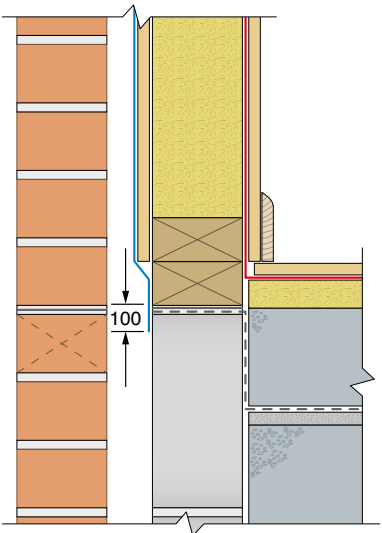
*All Tyvek® wall membranes are suitable in this application unless fire regulations require specific fire performance at certain heights

Detailing - Framed Wall Construction

A Tyvek® breather membrane can be installed either on site or as part of a factory fabrication process. The latter, traditionally, would be where a panel, complete with timber framework, sheathing and breather membrane would be manufactured, transported to site and erected. Today, the process has evolved into a thriving modular industry, with complete units being produced, incorporating internal finishes, services and sometimes furniture, carpets and curtains. This process carries with it significant time and cost savings, as well as improvements in quality control. Please also see note on Offsite and Modular Construction on page 11.

Site installation

Fig. 13 - Overlap at sole plate/bottom rail



Application of the Tyvek® breather membrane follows the same process for each method and starts from the sole plate or bottom rail, working upwards.

Sole plate (Fig. 13)

The Tyvek® membrane should be fixed at least 100mm below the lowest timber member, usually the sole plate.

The standard method of application for a Tyvek® breather membrane is for it to be unrolled horizontally over the face of the sheathing/framing, but it may also be laid vertically if this is more appropriate.

Laps (Fig. 14)

The upper run of Tyvek® membrane must overlap the lower to prevent water which may run down the wall from running behind the membrane. All horizontal laps should be at least 100mm and vertical laps 150mm.

Fixings

Tyvek® membranes are normally fixed to the sheathing with stainless steel staples or corrosion resistant nails. Fixings should be as follows:

Horizontal fixing

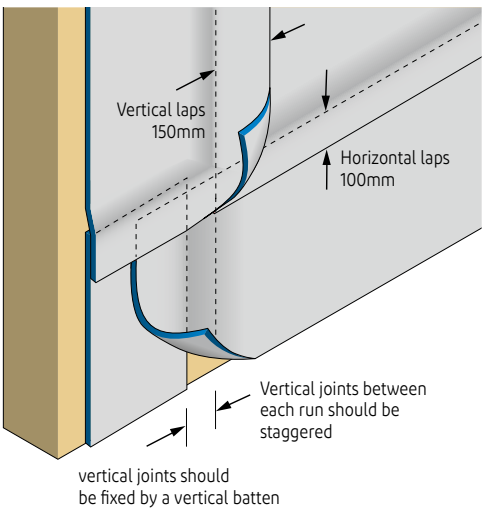
generally 600mm or at stud positions,

Vertical fixing

at stud positions	300 mm
at sides of openings	150 mm
at vertical membrane joints	150 mm
at end of panels*	150 mm

* required when membrane is fixed to panels in the factory.

Fig. 14 - Horizontal and vertical laps



Detailing - Framed Wall Construction

The locations of the studs should be marked onto the Tyvek® breather membrane to determine wall tie or batten fixing points. This is commonly done by using an indelible marker pen. PVC banding tape may also be used and is particularly recommended where the site is located in an area of very severe exposure, as it strengthens the fixing.

Fig. 15 - Factory manufactured panel

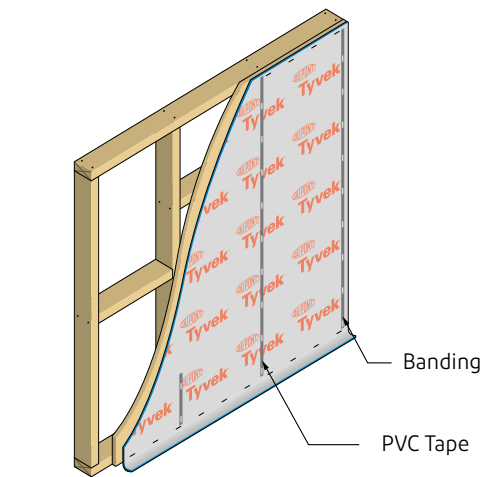


Fig. 16 - Cavity barrier at intermediate floor junction *

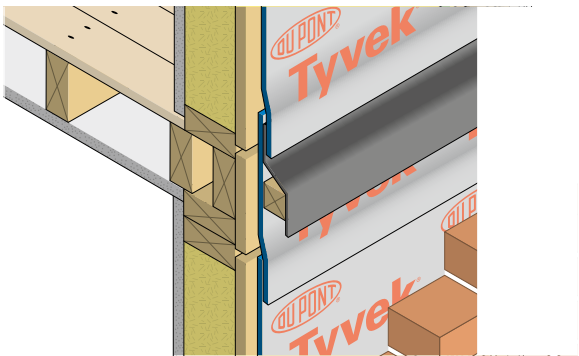
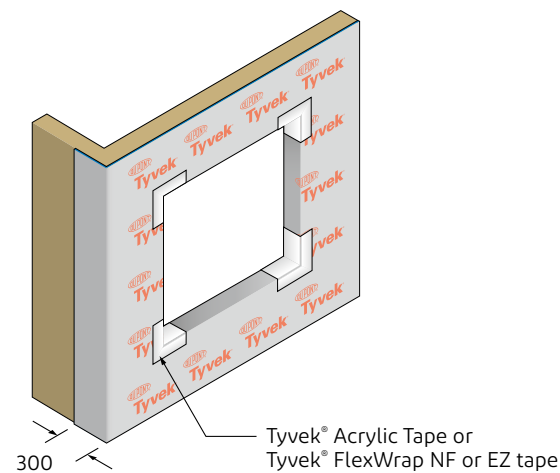


Fig. 17 - External corner and window opening



Pre-fabricated panels (Fig. 15)

Reinforcing tape is generally used where Tyvek® membranes are applied to panels in the factory. This provides additional tear resistance when transporting pre-made panels to site. Tyvek® membranes applied to panels in the factory should be fixed as listed in Table 1 and at the sides, head and base of each panel. The membrane should extend beyond the sides and base of panels to comply with the lap requirements shown in fig. 14.

Floor junctions (Fig. 16)

The membrane at the base of upper storey panels should be extended sufficiently to cover the intermediate floor zone and provide a 100mm lap over the lower panel. Lap sections on pre-fabricated panels should be temporarily fixed back for transport.

Cavity barriers (Fig. 16)

The Tyvek® membrane should lap over DPCs at horizontal cavity barriers, fire stops and cavity trays. Cutting the membrane and sliding a DPC behind will be sufficient. Alternatively a separate skirting strip may be used to ensure an adequate lap detail. Additional information on fire barriers can be found on page 34.

External corner (Fig. 17)

Returns around external corners should be at least 300mm.

Windows and doors (Fig. 17)

Extend the Tyvek® membrane over window and door openings. Cut an 'X' in the membrane and fold back. Make good to the corners with Tyvek® Acrylic Tape (single sided) or Tyvek® FlexWrap NF or FlexWrap EZ.

Fig. 18 - Window head (render & lathe)

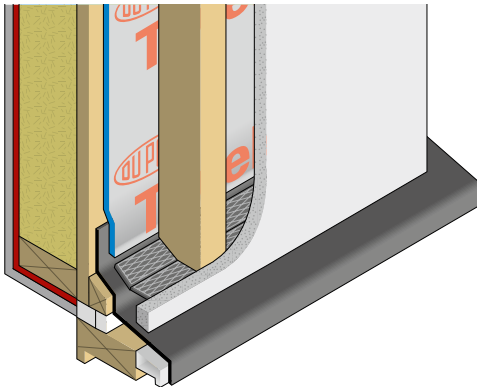


Fig. 19 - Base detail (render & lathe)

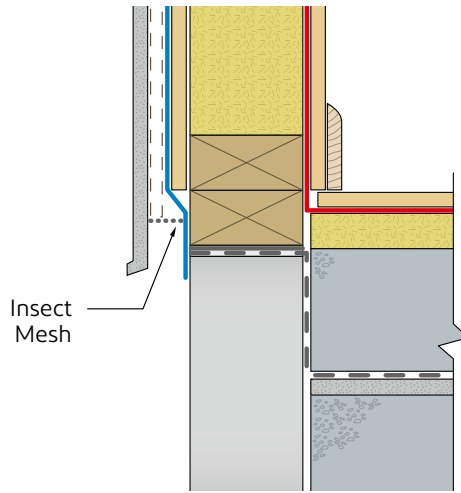
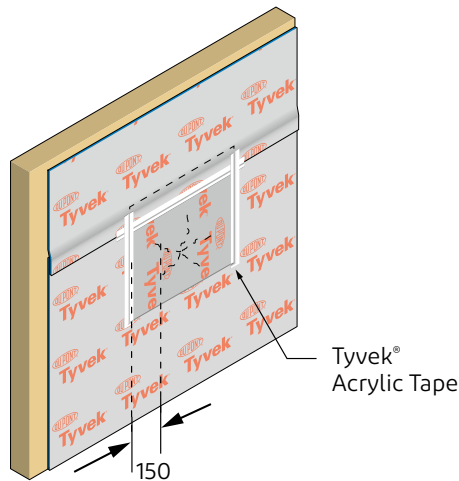


Fig. 20 - Damage repair



Window head

If an outer leaf of brick/block is being used dress the Tyvek® membrane over the cavity tray as in Fig. 16.

If external cladding such as tile hanging, weatherboarding, render and lathe is used, dress the Tyvek® membrane over a proprietary flashing (Fig. 18).

Base details for cladding

Generally, the Tyvek® membrane is finished at base level as in Fig. 13. But the batten space behind the cladding, should be closed off with an insect mesh/screen (Fig. 19).

Fixing to masonry

The Tyvek® membrane should be mechanically secured to masonry with a suitable anchor fixing system or a masonry nail/screw and EPDM rubber washer. Fixings should be at maximum 500mm centres.

Fixing to steelwork

Fix the Tyvek® membrane to steelwork with a suitable drill-tip or self-tapping screw and EPDM washer. Tyvek® Double Sided (acrylic) Tape may be used for temporary fixing.

Damage repair

Any damage that occurs in a Tyvek® membrane should be made good as soon as possible:

- Minor damage may be repaired with Tyvek® Acrylic Tape (single sided).
- More extensive damage should be covered with a Tyvek® patch (Fig. 20)
- Large areas of damaged Tyvek® should be replaced completely.

Airtightness

Heat loss by convection will occur at all horizontal and vertical laps, door and window details. Air leakage can be reduced by sealing the membrane at these points with adhesive tape. This can be achieved by using Tyvek® Acrylic Tape (single sided), Tyvek® Double-sided Tape (acrylic) and/or Tyvek® FlexWrap NF. Any brackets or components that are retrospectively fixed over the membrane may be sealed with Tyvek® Butyl Tape (double-sided) if necessary.

All Tyvek® wall membranes are suitable in this application unless fire regulations require specific fire performance at certain heights

Suitable membranes:
Tyvek® Housewrap, Tyvek® StructureGuard™,
Tyvek® UV Facade and Tyvek® Reflex,
Tyvek® FireCurb® breather membrane

Detailing - Framed Wall Construction

Vapour control - vapour diffusion

Timber and steel frame wall construction involves the installation of a sheathing board fixed to provide wind bracing, lateral strength, etc. This layer is fixed to the external face of the framework, which is regarded as standard practice (see Fig. 12). Sheathing boards of plywood, oriented strand board or cement particle board (steel frame) are commonly used, but contain adhesives and are relatively vapour resistant. Performance requirements regarding thermal and condensation control are generally met, but are in part dependant on the existence of other essential components such as an internal vapour control layer (AVCL). Workmanship in installing an AVCL is important as the integrity of this layer will determine its effectiveness in preventing/reducing water vapour transfer via convection into the construction. This is water vapour that can condense on any cold impermeable surface within the construction.

The “5 times rule”

Effective vapour diffusion, or vapour release, on the cold (external) side of the construction is equally as important as vapour control on the warm (internal) side. Materials on the warm side of the construction should have a greater vapour resistance than those on the cold side. As a guide, a ratio of at least 5:1 is recommended, also known as the “5 times rule” for vapour resistance. Installing a vapour resistant membrane internally to stop the vapour and a breathable membrane fixed externally to let vapour out will ensure that moisture is not trapped within the construction. This forms the basis of a “breathing wall” construction.

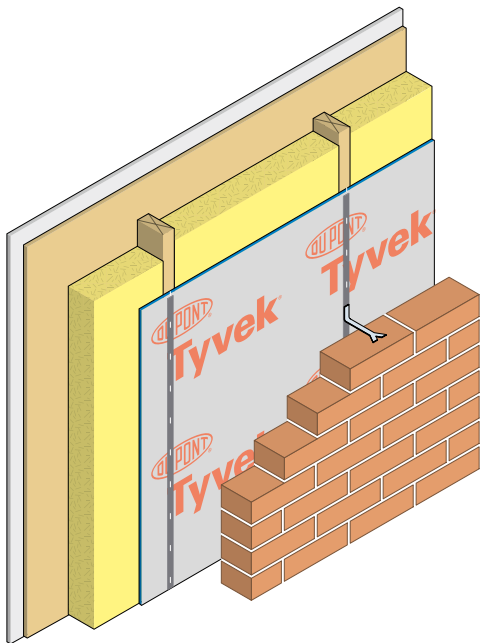
Reverse wall construction (Fig. 21)

An alternative process of constructing timber and steel frame walls is to install the sheathing board on the internal side of the framework. The Tyvek® breather membrane can then be fixed directly

to the external face of the framework, providing protection to the construction as well as retaining the insulation. This would affect the fixing sequence, but the benefit here is that when a sheathing board is installed internally it can provide additional vapour control for the system as the materials are generally vapour resistant. In this case particular attention will need to be paid at all board joints and penetrations to prevent excessive water vapour transfer into the construction. Sealing these weak points will assist in achieving a convection tight system. However, the use of a dedicated vapour control layer/air leakage barrier such as AirGuard® Reflective is still recommended between the sheathing board and insulation.

A reverse wall construction would not be so beneficial in a timber/steel frame system that has additional insulation installed on the cavity side of the sheathing.

Fig. 21 - Reverse wall construction



When timber and steel frame walls are internally sheathed, the sheathing board may provide the racking strength, contribute to fire resistance, comply with surface spread of flame (reaction to fire) classification and provide the internal decorative surface. Such boards may include cement-bonded particleboard, fibre reinforced gypsum board, mineral fibre boards, and fire retardant treated plywood, OSB and chipboard.

The use of timber based boards as internal linings may be limited by surface spread of flame (reaction to fire) requirements. Their fire resistance can be improved with the application of treatments/coatings, but demonstration of compliance with the relevant fire regulations may still be required.

Fire Regulations should be checked for material suitability

Suitable membranes:
Tyvek® Housewrap, Tyvek® StructureGuard™,
Tyvek® UV Facade, Tyvek® Reflex and
Tyvek® FireCurb® breather membrane

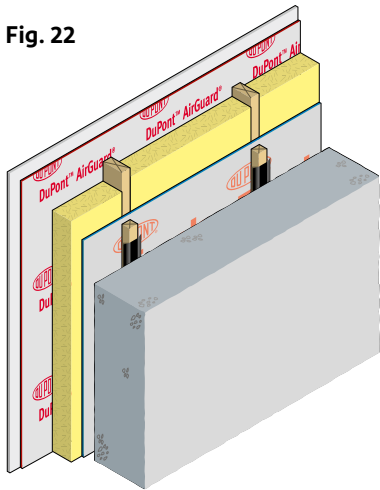
Note: Specifying a reverse wall construction may affect details at junctions, floors, roof, etc. and designers should take this into account when considering this method of construction.

Detailing - Masonry Wall Construction

Internal insulation upgrade (Fig. 22)

Existing solid masonry/stone walls invariably suffer from internal mould problems arising from condensation due to their poor thermal performance. Upgrading these constructions commonly involve the installation of an internal insulated panel. This has the benefit of providing a clean, dry internal lining as well as improving overall thermal performance. Condensation and mould growth will not then be apparent, but potentially can still occur on the masonry/stone surface, which is now hidden from sight within the construction. In normal circumstances the cavity between a timber frame wall and brick and block cladding should be ‘self draining’ and ‘vented’ to prevent the build-up of moisture. The installation of airbricks, cavity tray and weep holes would ensure this. However, as this may not be possible with an internal insulation upgrade, emphasis should be placed on the vapour controlling abilities of the internal lining to prevent vapour from diffusing into the construction in the first instance.

Fig. 22



Battens should be fixed to the inside face of the existing wall via strips of DPC for protection against moisture. A new Tyvek® covered insulated panel can then be constructed away from the existing wall.

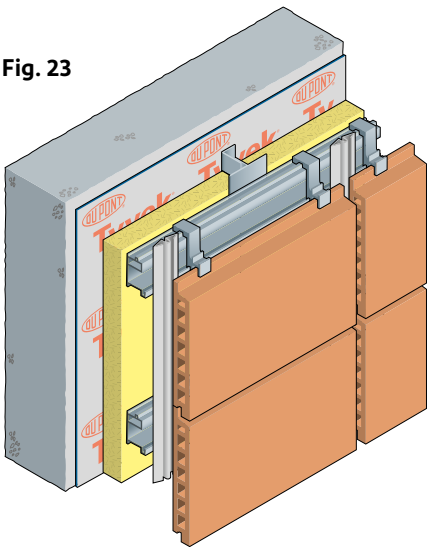
An internal air & vapour control layer (AVCL), such as DuPont™ AirGuard® Reflective should be installed with meticulous attention paid to all laps, edge details and penetrations. Sealing the AVCL in this system is key to the prevention of condensation on the inside face of the existing wall.

For best practice, the internal lining (plasterboard) should be spaced off the AVCL with battens, helping to minimise penetrations through the membrane. This newly formed ‘services void’ will also allow DuPont™ AirGuard® Reflective to boost the overall thermal value of the wall system. For further information on AVCL detailing please see pages 47-55.

Rainscreen cladding (Fig. 23)

Rainscreen cladding systems differ from other wall constructions, as although the membrane is still fixed directly to the structure, it is situated behind the insulation. This is due to the nature of the cladding system which employs a supporting rail that penetrates the insulation, making the application of an external membrane very problematic. Many rainscreen systems offer high levels of protection from precipitation and several insulation types are moisture resistant. In these instances a Tyvek® membrane may not be required, but joints should be considered.

Fig. 23



Where there is a risk of moisture penetration through the insulation and internal layers, a protection membrane behind the insulation is advised. The material to specify is dependant on the risk of condensation at this interface, determined in the main by the temperature. If in doubt a breather membrane should be used. In any case the material should be water resistant.

Fixing: For guidance on fixing Tyvek® to masonry and steelwork please refer to the notes on page 25.

Suitable membranes:
Tyvek® Housewrap, Tyvek® StructureGuard™,
and Tyvek® FireCurb® breather membrane

Case Studies

ESS Modular



Hospital Ward, Cork, Ireland



42 Luxury apartments in Hendon, London, UK. Up to 80% offsite in ESS modular's manufacturing facility



Hospital Wing, Kilkenny, Ireland



ESS Modular, Three decades of experience www.essmodular.com





High Rise, Multi occupancy Commercial, Residential, Health, Education...

- Ventilated Facade Systems - *see pages 31 to 39*
 - Breather Membrane placement - *see pages 32 & 33*
 - Penetrations & Brackets - *see page 33*
 - Fire Stops & Barriers - *see page 34*
 - Window Details - *see page 35*
 - Separating (Party) Walls - *see pages 36 & 37*
- Weatherboard systems (why a membrane is essential) - *see pages 16 to 18 & 31*
- Breather Membrane section - *pages 15 to 27, 31 to 35, 38 to 36, 72 & 73, 76 to 78*
- Air & Vapour Control Layer with variable resistance - *see pages 50 to 55*
- Heat Loss in Buildings - *see page 56*
- Fire and Smoke System - *see pages 57 to 63*
- Window and door details - *see pages 35, 64 to 69*

Useful step by step installation guides and videos are available from the DuPont™ Tyvek® Building Knowledge Centre and our web sites:

www.building.dupont.co.uk

www.energy-efficiency.dupont.com

Important:- All building regulations should be checked to ensure compliance, especially with respect to fire performance

Ventilated Façade Systems

Masonry and Steel Frame Construction

The evolution that has occurred over the last 30 years with external wall systems has been significant. They have become more technical in terms of thermal performance, moisture management, airtightness and fire protection.

Traditionally, masonry and steel construction was limited to agricultural buildings and warehouses and this general perception still exists today. However, they are now commonly employed in a wide range of developments, including offices, factories, schools, public buildings and some residential dwellings.

In medium to high-rise developments, masonry or steel structural elements are often preferred, and these commonly include infill wall panels composed of lightweight galvanized steel framing.

The strength and durability of these components makes them resistant against extreme wind conditions and moisture. Thermal insulation, sheathings and internal linings however, must still be protected and therefore the functions provided by DuPont™ Tyvek® and AirGuard® membranes continue to be essential.



SFS - Rainscreen Wall System

Membrane A

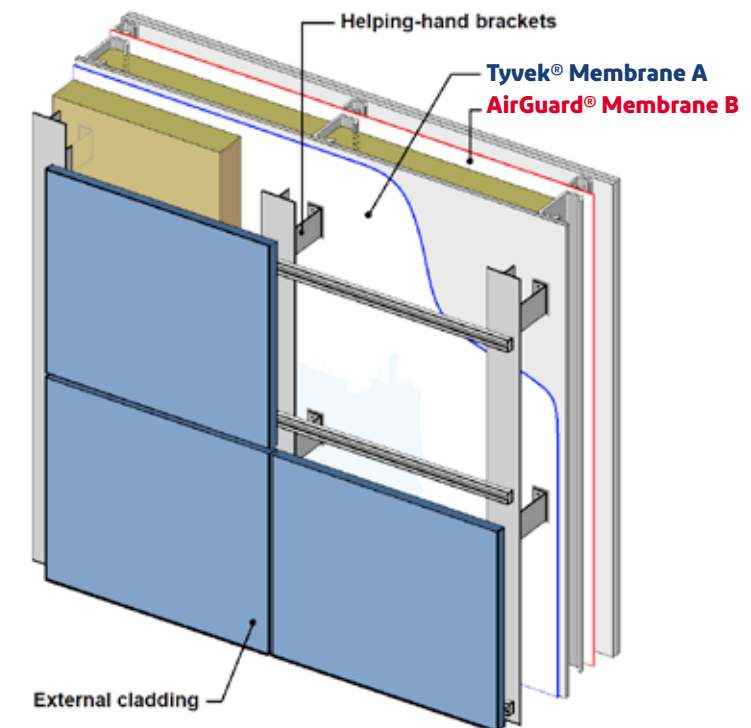
The illustration opposite shows a typical Rainscreen System with a Tyvek® FireCurb® breather membrane (**Tyvek® Housewrap, Tyvek® StructureGuard™ or Tyvek® FireCurb®**) fixed directly over the sheathing. The insulation fitted between cladding brackets would need to be suitably moisture resistant.

The membrane on the sheathing could be an AVCL if no insulation is to be installed between the SFS (or very little).

If some insulation is installed between the SFS, the external membrane will need to be a breather membrane, to avoid condensation occurring.

Membrane B

The AVCL is normally installed behind the dry-lining spaced off by a services void (battens or channels). Recommended AVCL for SFS systems is **AirGuard® Reflective** or **AirGuard® A2 FR**.



Detailing Commercial wall systems - Tyvek® & AirGuard® membranes

Membrane on the insulation

The traditional position for a Breather Membrane in an external wall system is on the outside (cold) face of the insulation. The water resistance of Tyvek® membranes far exceeds the EN13859-2 W1 class (see page 17) so they provide exceptional weather protection to the wall, both during construction and in the long term.

Applying the membrane to the outside face of the insulation can be difficult, as it will have to be cut and formed around the many brackets that are fixed back to the sheathing and extend through to support the external cladding. These penetrations will have to be made weathertight by sealing with the appropriate single-sided tape (see illustration opposite).

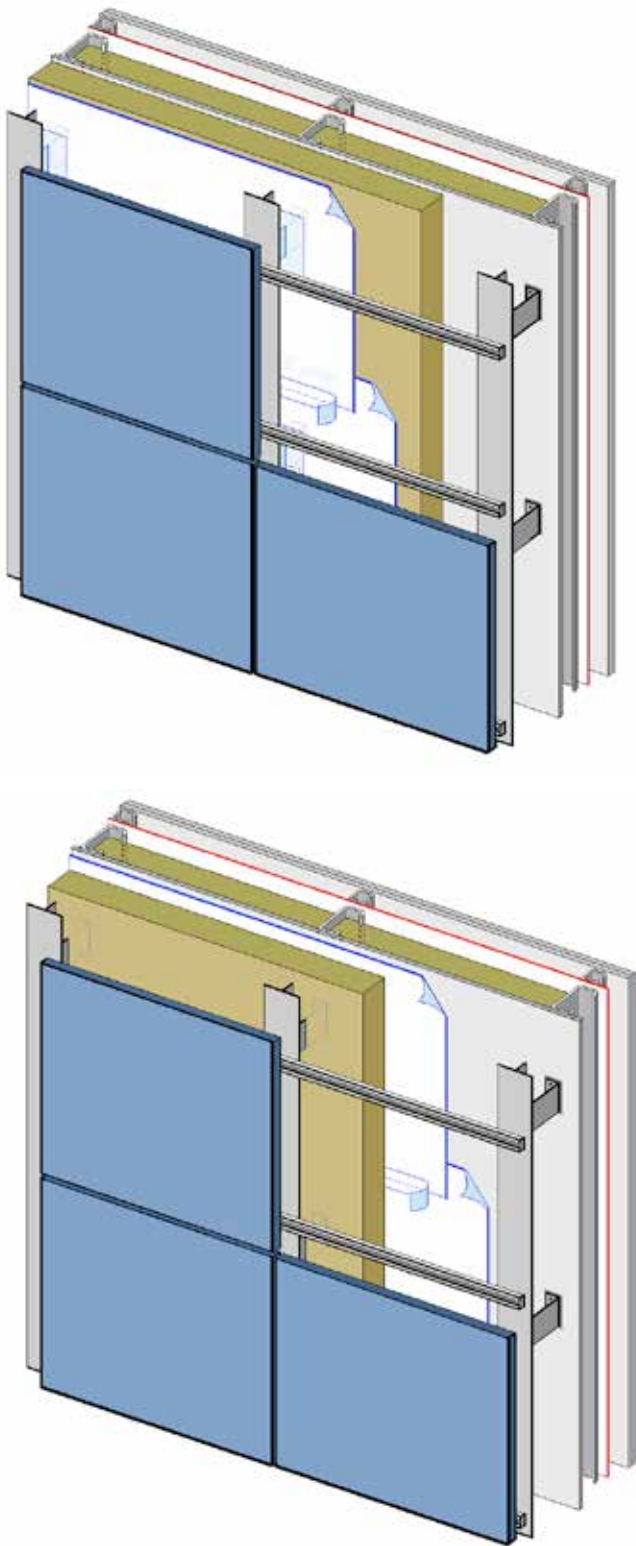
Membrane behind the insulation

Rainscreen systems often incorporate an insulation product that is resilient to moisture, allowing the membrane to be installed behind it, directly onto the sheathing board. A noteworthy benefit here is that the membrane can be installed easily and very quickly, allowing the wall system to be protected from the weather at the earliest possible opportunity. This method avoids the time-consuming process of cutting and taping around the brackets (described above). Designers and installers should check that this arrangement is accepted by all parties involved.

Moisture Resistant Sheathing

Using a Tyvek® breather membrane in a rainscreen system will ensure continuous weather protection is provided to the sheathing, insulation, structure and the building interior. Some sheathing products are purported to have a weather resistance function, to the extent that a VPM is not needed.

Specifiers are advised to check that such claims are supported with third party documentation which demonstrate suitability. Emphasis should be on compliance with the relevant technical standards and regulations that specifically address **RESISTANCE TO EXTERNAL MOISTURE**. Where such products do not state compliance, or where doubt exists, a Tyvek® breather membrane should be used. In any case the joints of sheathing products must be protected against water ingress.



Ventilated Façade Systems

Penetrations & Brackets

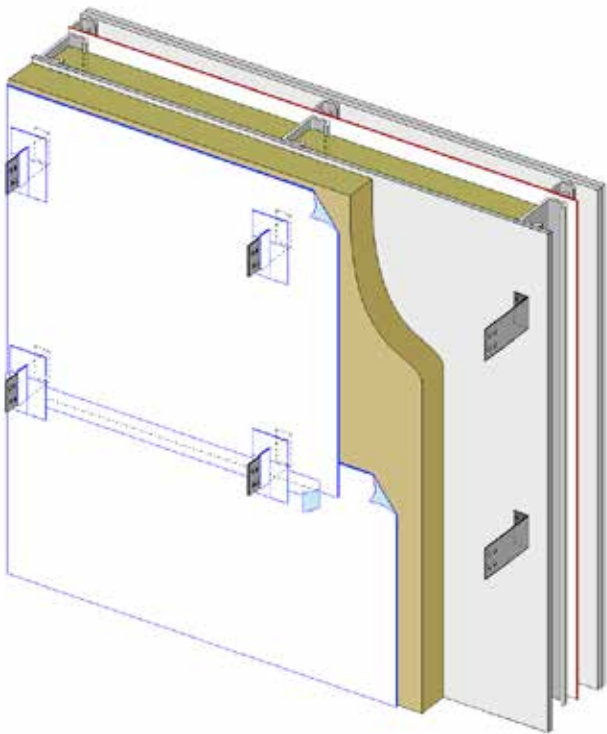
When the Tyvek® breather membrane is fixed onto the external face of the insulation, the main emphasis should be on its ability to keep external moisture out of the construction.

Lapping the membrane in accordance with the prescribed recommendations (100mm horizontal, 150mm vertical) will generally suffice, but penetrations through the membrane will compromise its integrity and must be sealed with the appropriate tape.

External Airtight Line

For some projects, it may be preferred for the Tyvek® breather membrane to provide external airtightness to the wall element. To make this a viable solution, meticulous attention will need to be paid to the membrane's continuity by sealing all laps and penetrations.

As shortfalls in airtightness very often occur during installation designers and installers should aim for the best results possible, to allow for some margin of error. On-site assistance with membrane installation and detailing is available on request from DuPont Tyvek®



- Above: Laps in Tyvek® StructureGuard and Tyvek® FireCurb® breather membranes are sealed with Tyvek® Acrylic Tape.
- Helping-hand bracket penetrations can be sealed with Tyvek® Acrylic Tape or Tyvek® FlexWrap EZ.
- Tyvek® Butyl Tape is suitable for use behind brackets, where required



If an external airtightness line is required, plastic insulation anchors should be covered over with single-sided tape



Tyvek® UV Façade Tape is a dedicated sealing tape suitable for sealing laps and bracket penetrations through Tyvek® UV Façade membrane

Detailing Commercial wall systems - Tyvek® & AirGuard® membranes

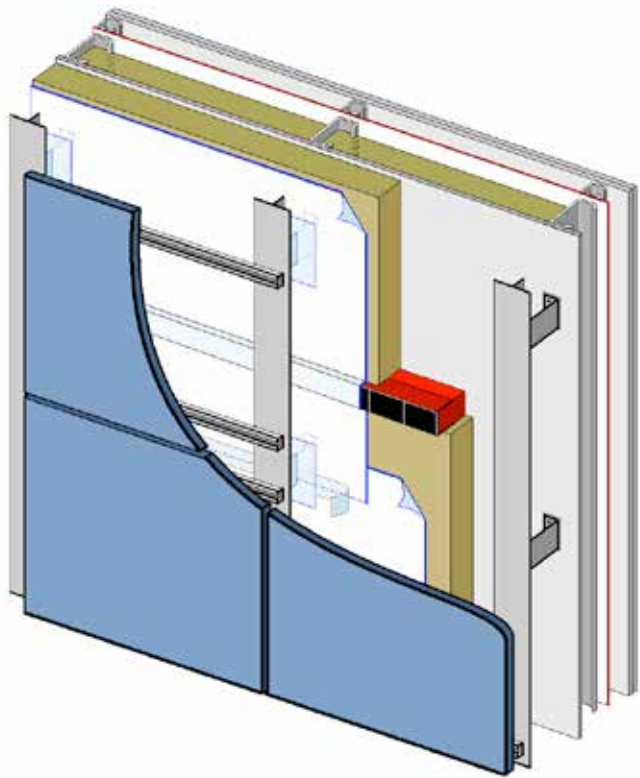
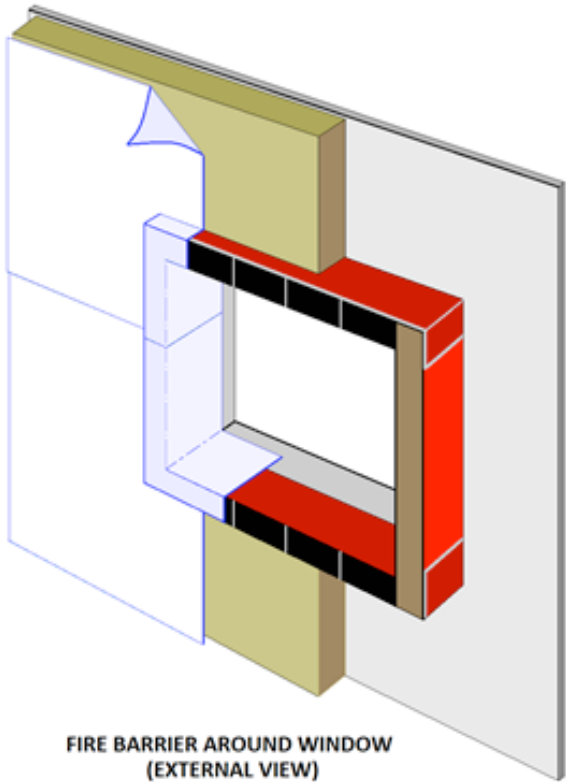
Fire Stops & Barriers

Ventilated Rainscreen Systems commonly incorporate airspaces that run continuously behind the external cladding. Fire spread through these airspaces , termed the 'Chimney Effect' must be prevented by way of compartmentation in accordance with relevant national regulations.

Regional Fire Regulations

- England and Wales: Approved Document B
- Scotland: Technical Handbook, Section 2
- Northern Ireland: Technical Booklet E
- Ireland: Technical Guidance Document B – Fire Safety

Horizontal and vertical fire barriers should be installed in accordance with regulations and manufacturers advice and subsequent insulation layers fitted tight against them. Where a Tyvek® breather membrane is installed on the external face of the insulation, it must be dressed continuously over the fire barrier to maintain the system's weathertightness. This will not impair the performance of the fire barrier product, including those that incorporate an intumescent element. The membrane will need to be cut and formed around the fire barrier and made good with the appropriate single-sided Tyvek® tape product (see footnote).



Tyvek® Tape	Suitable use
Tyvek® Acrylic Tape	Tyvek®StructureGuard™ laps Tyvek® FireCurb® laps Making good & penetrations
Tyvek® UV Facade Tape	Tyvek® UV Façade laps Making good & penetrations
Tyvek® Butyl Tape	Sealing behind brackets

The Tyvek® membrane should be dressed over fire barriers that are fitted around windows. This will maintain the integrity of the window opening for air sealing and weather tightness. The normal recommendations for lapping and tape sealing apply.

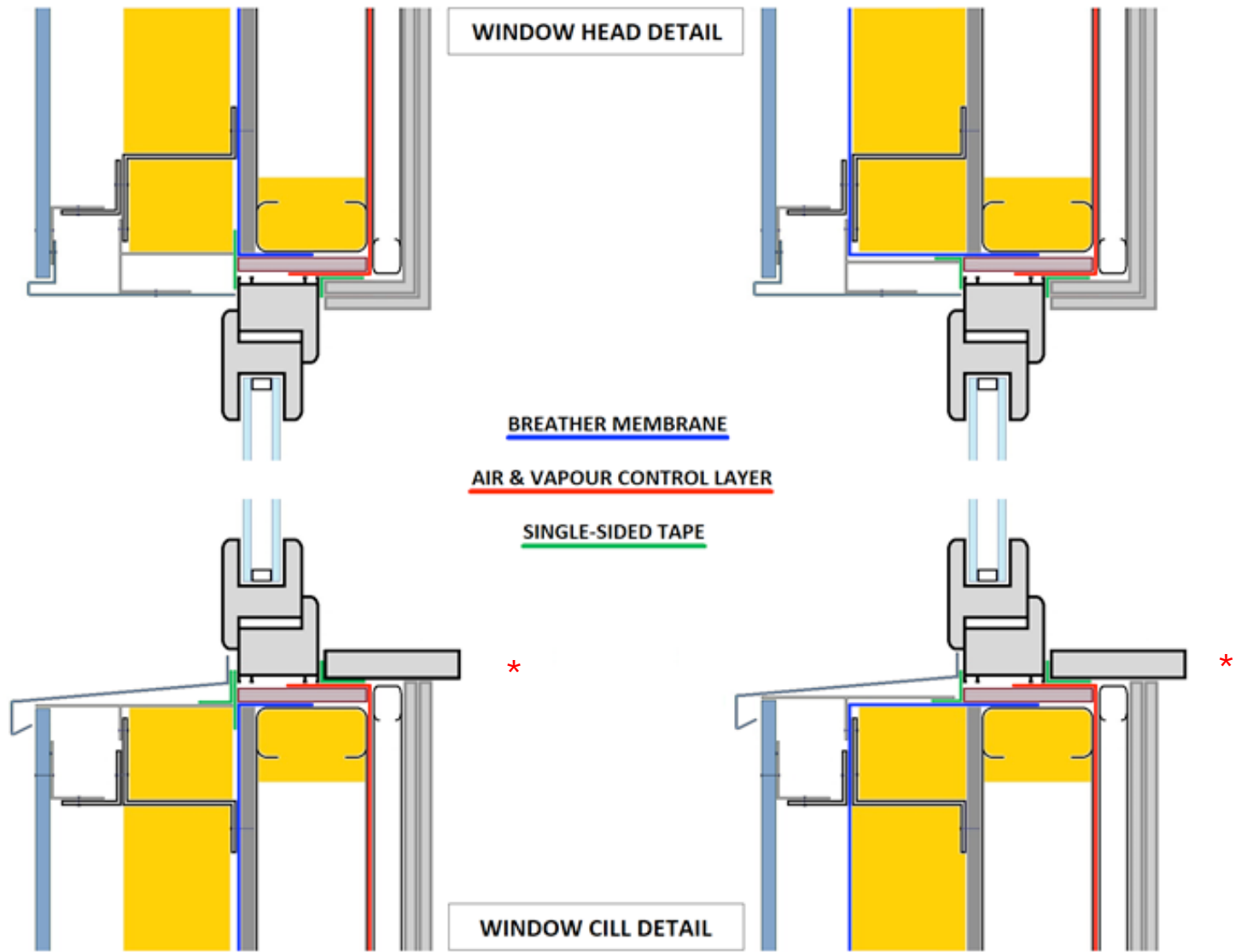
Ventilated Façade Systems

Window Head & Cill Details

The windows (& doors) of a rainscreen wall system should be designed and installed so that water is directed around the detail and to the outside of the building, rather than into wall cavities. The head of the window should include a flashing detail that diverts water that is draining down the cavity to the outside. The cill detail at the base of the window should be designed with similar drainage objectives. Regardless of whether the external membrane is installed in front or behind the insulation, it is still acting as a **secondary water-shedding layer** and must be detailed to effectively drain moisture to the outside in a similar way to flashings. Adhesive tapes (or sealants) should be used to seal the window frame and membrane interface (see illustration below).

It is often the case that the internal AVCL and external Breather membrane can be lapped and sealed within the window head/cill/ reveal (according to the sequence of work and whether or not the window is fitted much later). To maintain air and vapour sealing, the window to membrane interface must also be sealed to prevent condensation occurring behind the frame. Suitable components within the window detail, such as plywood linings may be used to form part of the airtightness line. Again, adhesive tapes (or sealants) should be used to seal the window frame and membrane interface (see illustration below).

Tyvek® Breather Membrane Behind Insulation * Tyvek® Breather Membrane on Insulation *



Recommended link to CWCT website: <https://www.cwct.co.uk/pages/specification>

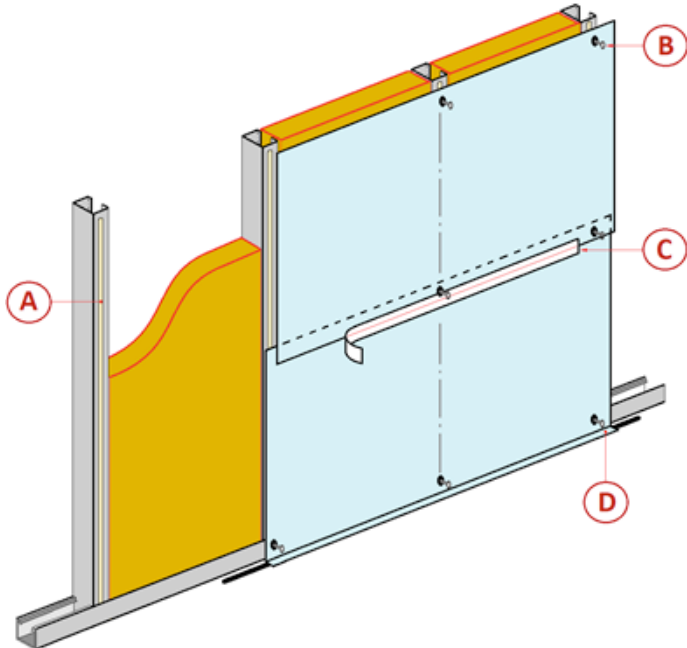
Detailing Commercial wall systems - Tyvek® & AirGuard® membranes

Internal AVCL Fixing

DuPont™ AirGuard® Reflective and AirGuard® A2 FR are the most suitable membranes for internal application in SFS systems. Both membranes have high vapour resistance, are 100% airtight and have low emissivity (reflective) surfaces.



- A.** Continuous strip of Tyvek® Double-Sided Tape applied to all studs.
- B.** Drill-tip (self-tapping) screw with EPDM or rubber washer fixed into metal stud, through membrane and Tyvek® Double-Sided Tape.
- C.** All laps & penetrations in DuPont™ AirGuard® AVCL to be sealed with Tyvek® Metallised Tape.
- D.** AVCL dressed forward and sealed to floor with continuous strip of Tyvek® Butyl (double-sided) Tape



Above: DuPont™ AirGuard® AVCL – Installation onto SFS wall

Separating (Party) Walls

A party wall in domestic properties commonly refers to the dividing wall between adjoining semi-detached or terraced properties. In many cases the details and specifications can be shared with commercial projects such as offices, schools, sports and medical facilities. The purposes of each building can have an influence on the design and choice of building fabric, but in essence the principles of separation are common to all.

The various rooms or compartments incorporated within a commercially oriented building can often have very different functions from each other. The individual use of the rooms, the occupancy level, the appliances used within, the temperature and humidity and the specific requirements for ventilation make ‘separation’ a key factor in building design. It is important therefore that the environmental conditions that prevail within each room are maintained as efficiently as possible. This guidance is intended to offer typical examples of efficient and buildable solutions to achieve these goals, using a DuPont™ AirGuard® AVCL.



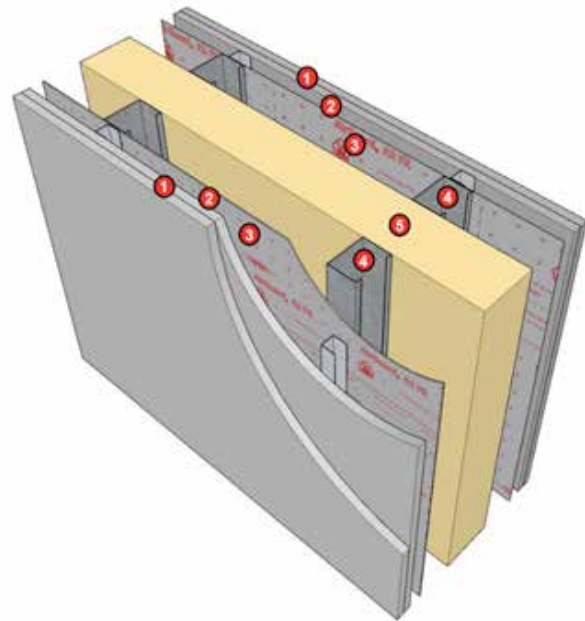
Energy Efficiency Durability Moisture Control

Air Quality Sound Proofing Fire Safety

Ventilated Façade Systems

Separating (Party) Walls

Steel frame: Double-stud system (Lightweight)



This diagram shows a Double-stud SFS separating wall, suitable for lightweight steel frame houses and apartments. A flexible semi-rigid insulation fitted in the cavity, separates the twin steel frames. Either side is AirGuard® A2 FR AVCL providing airtightness, vapour control and fire safety, helping to maintain the individual air quality and energy efficiency characteristics between zones.

Seperating wall build-up

- 1. 2 layers of 15mm sound insulating plasterboard
- 2. Services void
- 3. DuPont™ AirGuard® AVCL (AirGuard® A2 FR)
- 4. Metal stud
- 5. Flexible insulation

Steel frame: Double-stud system

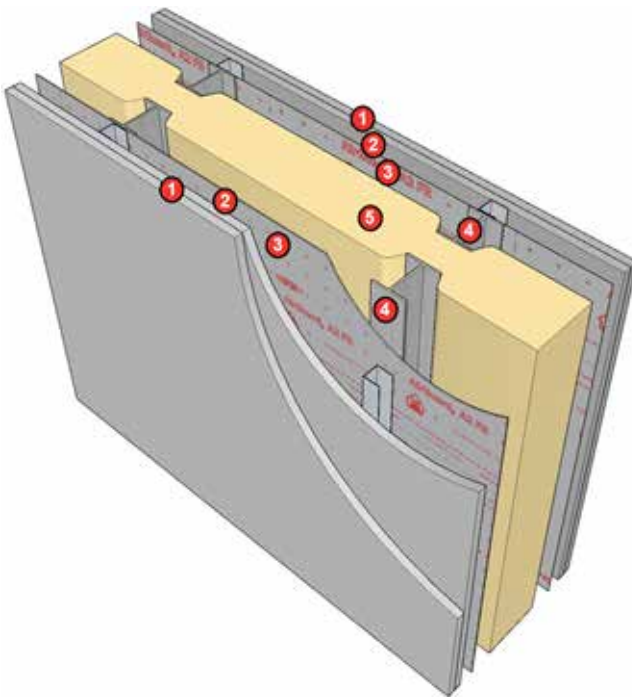


Diagram shows a steel frame ‘Double-stud’ separating wall system, which would **only be used with a reinforced concrete frame construction**. Components are similar to the previously shown lightweight system, but with a compressible semi-rigid insulation fitted in the cavity, separating the twin steel frames. AirGuard® A2 FR AVCL is installed on both sides to provide airtightness, vapour control and fire safety, helping to maintain the individual air-quality characteristics between zones.

Separating wall build-up

- 1. 2 layers of 15mm sound insulating plasterboard
- 2. Services void
- 3. DuPont™ AirGuard® AVCL (AirGuard® A2 FR)
- 4. Metal stud
- 5. Flexible insulation

Recommended AVCL for separating wall systems:

DuPont™ AirGuard® A2 FR

DuPont™ Tyvek® UV Facade installation

Permanent protection for open and ventilated rainscreen cladding

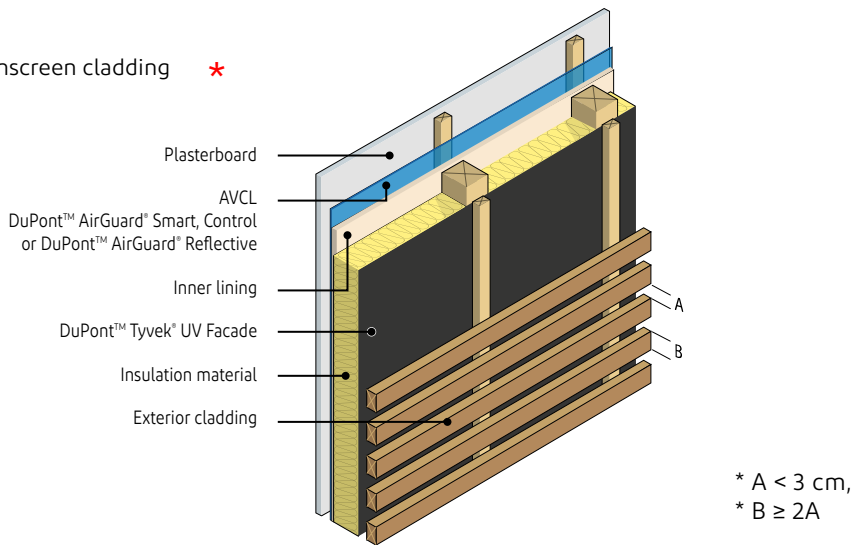
Long-term performance

Facades with open rainscreen cladding offer new design options, but the insulation and structure still require effective, permanent protection from the harmful effects of the elements to which it is constantly exposed. In particular UV radiation can compromise the long-term performance of secondary protection membranes. That's why DuPont have developed Tyvek® UV Facade, an advanced protective membrane specifically designed to meet the needs of open cladding constructions.

Open Rainscreen Cladding (Fig. 23)

Tyvek® UV Facade ensures optimum protection of the insulation and structure in open or ventilated cladding constructions from sunlight, wind and moisture. Unique in its class, Tyvek® UV Facade is the only known protective membrane for open-jointed cladding systems to carry the CE marking, certifying full conformity with the European Union's rigorous construction products directive. To obtain the CE marking for open cladding use, the membrane has to resist an artificial ageing by UV of 5000 hrs (for a standard wall/ roof application it is 336 hrs), followed by a 90 days exposure to 70°C.

Fig. 24 Open rainscreen cladding *



Unique Properties:

- Proven long-term UV resistance (only known membrane with publicly available CE marking for open cladding use)
- 10-years warranty for joint width of up to 3 cm
- Lifespan of over 50 years for joint width of up to 2 cm
- For open joints of up to 3 cm
- Wind-tight, water-tight (w1) but vapour-open
- Suitable for open or ventilated cladding in timber, metal, stone and other materials
- Extremely lightweight, flexible and easy to install
- Can be left uncovered for up to 4 months while retaining full performance

However we recommend to cover Tyvek® UV Facade just after its installation.

To seal overlaps we recommend the use of the two adhesive tapes below which are compatible with Tyvek® UV Facade:

- Tyvek® UV Facade Tape which has a high UV resistance, excellent ageing properties and long term outdoor performance.
- Tyvek® Double-sided Tape which has a strong initial tack and excellent adhesion properties under extreme humidity conditions and varying temperatures.

Tyvek® UV Facade Plus

The Tyvek® wall membrane range is enhanced with Tyvek® UV Facade Plus which incorporates an acrylic self adhesive strip in the lap. This allows the membrane to be easily and effectively sealed for improved weather protection or for the prevention of air leakage. For air-sealing purposes Tyvek® UV Facade should also be used to make good to cuts and penetrations made in the membrane.

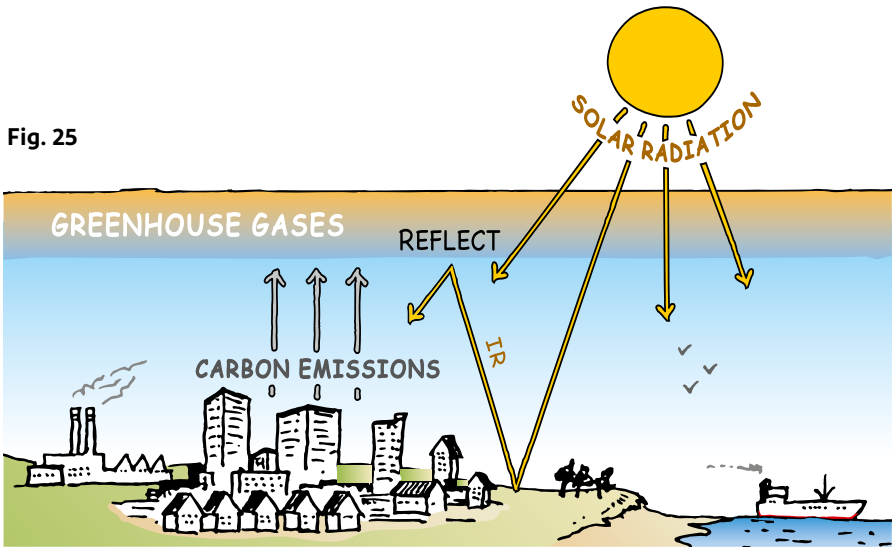
Tyvek® UV Facade Installation Sheet



Climate Change & Sustainability

Since the Rio Earth Summit addressed climate change as far back as 1992 the process of stabilising atmospheric carbon dioxide has been long and meticulous. The Kyoto Protocol which followed in 1997 set the targets and formed the international agreement for governments to make reductions in greenhouse gas emissions – reductions that count! The UK's Energy White Paper in 2003 and The Stern Review of 2006 have both added impetus to the cause, with the latter confirming the supporting scientific evidence as being “overwhelming.”

Fig. 25



Greenhouse effect

The prescribed solution for the UK is to achieve an 80% reduction in carbon dioxide emissions by 2050 compared to 1990 levels. Now enforced by the Climate Change Act 2008, with progress managed by the Department of Energy and Climate Change.

The environmental impact of UK Construction

The construction and use of buildings in the UK impacts upon the environment directly and reportedly contributes 43% of all CO₂ emissions. The strategy for the UK construction industry to achieve a sustainable environment and meet the new climate change objectives was set out within the EU Energy Performance of Building Directive (EPBD) in 2006. During its three year implementation period higher standards of energy conservation for new and refurbished buildings were initiated and the Energy Performance Certificate (EPC) was introduced.

In 2007 the UK governments Policy Statement, Building a Greener Future: Towards Zero Carbon Development set the scene for today's legislation for all buildings to be constructed to higher sustainability performance standards. The UK government's method of enforcing step changes in energy efficiency was translated through The Code for Sustainable Homes, which greatly influenced the building industry and governing legislation for several years before being withdrawn in 2015.

The Climate Change Act 2008 is still valid and sets out current and future requirements for UK construction:

- A 34% cut in 1990 greenhouse gas emissions by 2020: >40% achieved by phasing out coal and transition to Clean Energy
- A minimum 80% reduction in emissions by 2050: New legislation in 2019 for a 100% reduction in greenhouse gases relative to 1990 levels by 2050 (the UK to become a 'net zero' emitter).



It will be impossible to meet the 2050 objective without changing emissions from homes. An opened minded approach to energy efficiency is needed and a 'Fabric First' mindset needs to be maintained if we are to improve our new and existing building stock.

Building Regulations & Standards

The progressive changes to the various regional regulations and standards are intended to ensure that the prescribed reductions in carbon emissions are not just designed for but are actually achieved.

The documents continue to aim for high energy performance standards for the building fabric (walls, roofs, windows etc.) as well as its fixed building services (heating, lighting etc.). In addition to improvements in thermal insulation levels more control over thermal bridging and airtightness at junction details will need to be established. However, specific detailing can now be compared to a checklist within the Accredited Construction Details (ACDs) website, of the [DCLG's Planning Portal](https://www.planningportal.co.uk/info/200135/approved_documents/74/part_l_-_conservation_of_fuel_and_power/6) at:

https://www.planningportal.co.uk/info/200135/approved_documents/74/part_l_-_conservation_of_fuel_and_power/6

Thermal efficiency

The improvements being made to the industry's technical guidance are a logical progression over simply increasing the insulation, which has been the predominant solution to heat loss for the past 50 years. We have approached what could be termed a reasonable limit in insulation thickness and we should now be looking for other ways to reduce heat loss through the building fabric. Consideration should therefore be given to the three modes of heat transfer collectively:

- Conduction** This is where heat is transmitted directly through a solid construction material. Installing a layer of thermal insulation within the building fabric will help to reduce conductive heat loss. The more insulation is used the greater the reduction, but this will result in an increase in the overall wall build-up, taking up internal space.
- Convection** Heat is lost as it is carried out of the construction by air movement occurring through cracks and joints in the building envelope. A continuous airtight layer normally installed on the internal side of the construction will significantly reduce convective heat loss. Information on DuPont™ AirGuard™ Airtight Vapour Control Layers (AVCL's) can be found on pages 47 to 56.
- Radiation** As heat energy is conducted to the colder external side of a construction layer, its mode of transfer changes from conduction to radiation. The heat energy is then emitted away from the surface of the construction, across an airspace in wave form - similar to radio and light waves. Heat loss by radiation can be reduced by installing a material that has an external surface of 'low emissivity' such as aluminium. This idea has been utilised already by some insulation manufacturers that face their products with foil. The benefits of reducing heat loss by radiation have also been realised by DuPont in the manufacture of a low emissivity membrane that is also vapour permeable: **Tyvek® Reflex low emissivity breather membrane**

**Using building science to innovate as if
our future depends on it.
(Because it does)**

The biggest sustainability problems can't be solved without big contributions from the building and construction industry. Solving these problems calls for sweeping transformation in today's practices. As DuPont Performance Building Solutions, we're up to the challenge, and have charted a course to help make sustainability a reality in the building industry over the next decade. Inspired by the United Nations' Sustainable Development Goals (UN SDGs), and in support of the DuPont 2030 Sustainability Goals, we are committed to deliver solutions that help solve climate change, drive the circular economy, deliver safer solutions and help communities thrive.

For greater details on our Sustainability goals and achievements please see our websites:
www.dupont.com and www.building.dupont.co.uk

DuPont™ Tyvek® Reflex low emissivity breather membrane

Tyvek® Reflex is a low emissivity breather membrane suitable for use in any wall system that requires secondary protection from external moisture. It is the result of many years of research and development by DuPont to create a strong, water resistant and breathable membrane that assists in the reduction of heat transmission through the building envelope. It is particularly advantageous in lightweight wall construction such as timber or metal frame systems.

Composition

Tyvek® Reflex is manufactured by bonding aluminium particles to the external face of a ‘soft structure’ grade Tyvek® membrane. It is this metallised coating that presents the low emissivity surface, reducing the amount of heat being emitted from the construction. The overall thermal transmittance or U-value of the construction will be reduced because Tyvek® Reflex will reduce radiated heat losses.



Fig. 26

Tyvek® Reflex can be categorised as a “Radiant Barrier”.

A unique, specially formulated lacquer has been applied to the external metallised face of Tyvek® Reflex to provide maximum protection against oxidation and abrasion. The lacquer presents minimum resistance to the passage of water vapour, with no risk of cracking. Tyvek® Reflex is therefore suitably durable and flexible for factory or site installation.

Tyvek® Reflex has Class W1 watertightness to EN 13859-2 and is BBA certified as fit for purpose for use as a breather membrane.

Thermal value

Structural timber or metal stud dimensions are critical factors especially in prefabricated units and increasing stud depths is not always practical. Despite this, stud sizes may need to be increased to accommodate more insulation in order to comply with the thermal regulations. Tyvek® Reflex can help to alleviate this due to the additional thermal resistance that it provides.

The thermal benefit provided by Tyvek® Reflex compared to a standard breather membrane is demonstrated on the previous page with the U-values tables (DuPont™ AirGuard® Reflective & AirGuard® A2 FR are also included).

Condensation Risk

Increasing the thermal resistance of the adjacent airspace will also have the added benefit of reducing the risk of interstitial condensation. More heat will be retained within the sheathing as there is less heat being emitted by the membrane across the cavity. To reinforce this point the BBA have confirmed that Tyvek® Reflex ‘...will maintain the frame sheathing at a higher temperature than for the same construction incorporating a conventional breather membrane. This will in turn assist in limiting the risk of interstitial condensation ...’

Solar heat gain

Tyvek® Reflex will also help to reduce summer heat gain by reflection. Heat that builds up in the cavity behind brick/blockwork or an airspace behind cladding would normally be absorbed by the insulation/structure. The heat would then be transferred into the building by conduction and radiation. The metallised surface of Tyvek® Reflex will help to reduce this by reflecting the heat away from the structure beforehand. This would be particularly advantageous in constructions that contain minimal thermal insulation, eg. portable, lightweight or temporary buildings. A reduction in solar heat gain would also lessen the requirement for internal cooling provisions such as air-conditioning.

Thermal Resistance

DuPont™ Tyvek® and AirGuard® solutions for SFS external wall construction

Tyvek® Reflex (and airspace) = 0.57 m2K/W
DuPont™ AirGuard® Reflective (and airspace) = 0.67 m2K/W.
Please see pages 47 to 56 for more information.

Less insulation needed for the same effects > increased insulation value without increased wall thickness

U-Values of insulated 90mm SFS external wall construction:

External cladding and support system, breather membrane, 50mm continuous insulation, sheathing board, 90mm insulation between SFS, DuPont™ AirGuard® AVCL, 25mm service void, internal plasterboard lining.

Insulation Thermal Performance Lambda Value		Standard Membrane	Tyvek® Reflex	Tyvek® Reflex + AirGuard® Reflective	Tyvek® Reflex + AirGuard® A2 FR
Mineral wool	0.038	0.34	0.28	0.26	0.26
	0.036	0.33	0.27	0.26	0.26
	0.034	0.32	0.26	0.25	0.25
	0.032	0.30	0.25	0.24	0.24
PIR	0.022	0.23	0.20	0.19	0.19
Phenolic	0.018	0.20	0.17	0.17	0.17

U-Values of insulated 120mm SFS external wall construction:

External cladding and support system, breather membrane, 50mm continuous insulation, sheathing board, 120mm insulation between SFS, DuPont™ AirGuard® AVCL, 25mm service void, internal plasterboard lining.

Insulation Thermal Performance Lambda Value		Standard Membrane	Tyvek® Reflex	Tyvek® Reflex + AirGuard® Reflective	Tyvek® Reflex + AirGuard® A2 FR
Mineral wool	0.038	0.31	0.26	0.24	0.24
	0.036	0.30	0.25	0.24	0.24
	0.034	0.29	0.24	0.23	0.23
	0.032	0.28	0.23	0.22	0.22
PIR	0.022	0.21	0.18	0.18	0.18
Phenolic	0.018	0.18	0.16	0.16	0.16

■ good ■ average ■ poor

The figures in the above tables show the improvement in terms of thermal performance when standard membranes are replaced by a range of Tyvek® and AirGuard® membranes, including the new DuPont™ AirGuard® A2 FR fire retardant AVCL

Tyvek® Reflex Installation Sheet

DuPont™ Tyvek® membranes Installation in suspended timber floors

Moisture Management

When a structural timber floor system is installed, the joists should be strength graded and have an average wood moisture content of not more than 20%. Any higher and the risk of mould formation is increased leading to eventual decay and structural failure. In order to retain the integrity of timber floor components, current guidance recommends that cross ventilation is provided to the airspace beneath. This is common practise and is recommended to ensure that any water vapour in the air beneath the floor will not condense and damage the structure. Moisture that is present in adjacent concrete, brick and block components will also be allowed to dry out sufficiently.

Air-leakage

Ventilating beneath a suspended timber floor system is an effective means of removing moisture laden air, but can be thermally detrimental. Insulated timber floor systems commonly include discontinuous insulation between the joists. The gaps and joints at the edges of the insulation will allow cold external air to filtrate into the construction, accelerating the rate of heat loss and so reducing thermal performance. Cold air infiltration may also create cold surfaces within the construction, potentially increasing the risk of condensation. It is therefore important to achieve airtightness in suspended timber floor systems.

Airtightness

Tyvek® membranes have good airtight characteristics and will therefore greatly reduce the passage of convective air currents. Installing a Tyvek® membrane beneath floor insulation will assist in improving the overall airtightness of the floor construction and reduce heat loss.

Similar to the installation of a DuPont™ AirGuard® AVCL (see internal lining), workmanship in installing a Tyvek® membrane for airtightness is paramount. The extent of penetrations made by fixing the membrane should be controlled to a reasonable minimum. Sealing the membrane around fixing points may not be necessary if flat headed nails are used, but laps and edge details should be sealed.

Note: Airtightness can only be achieved if the membrane is laid continuously with sealed laps.

Airtightness and the control of interstitial condensation can also be achieved by installing a DuPont™ AirGuard® AVCL. For suspended floor systems DuPont™ AirGuard® Reflective is generally recommended (see pages 32-35 and 56 for information). However, for projects that have experienced low level damp issues, DuPont™ AirGuard® Smart may also be used. The DuPont™ AirGuard® AVCL may be laid continuously over the floor joists, directly beneath T&G timber or OSB floor boarding. To minimize the air-leakage effect of fixing penetrations, Tyvek® Butyl Tape may be applied over each joist beforehand. Laps should be sealed using Tyvek® Metallised Tape (Reflective) or Tyvek® Acrylic Tape (Smart).

Building physics dictates that as heat displaces air upwards, most of the moisture contained within the air will escape at high level. However, as internal vapour pressure will push moisture and heat outwards in all directions, an efficient floor system should also be considered. Using an AirGuard® AVCL on the warm internal side of the insulation, in conjunction with an external Tyvek® membrane will provide the ideal system arrangement for moisture control.

Material selection

Tyvek® Supro is a reinforced grade material which will provide adequate support to the insulation and is recommended for use in suspended timber floor systems.

Membrane over the joists and insulation is a DuPont™ AirGuard® AVCL for greatly improved airtightness and vapour control.

Suspended timber floors

Fig. 36 - Wall junction - joists running parallel

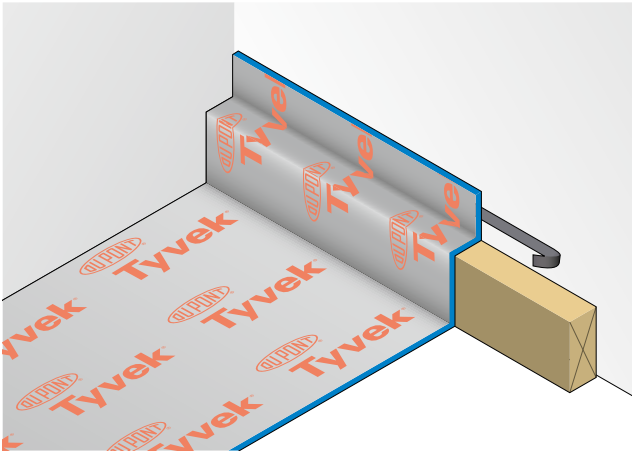


Fig. 36a - Wall junction - joists at right angles

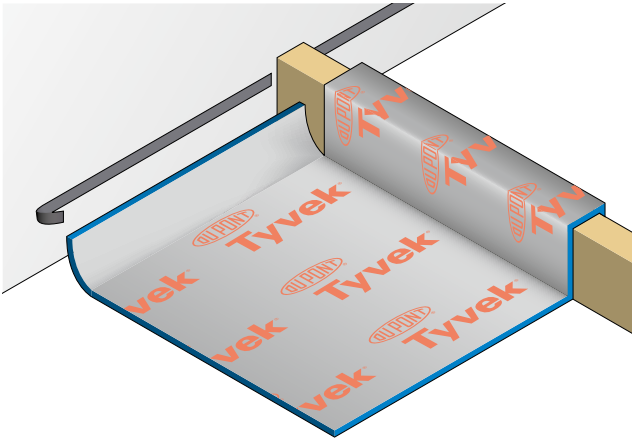
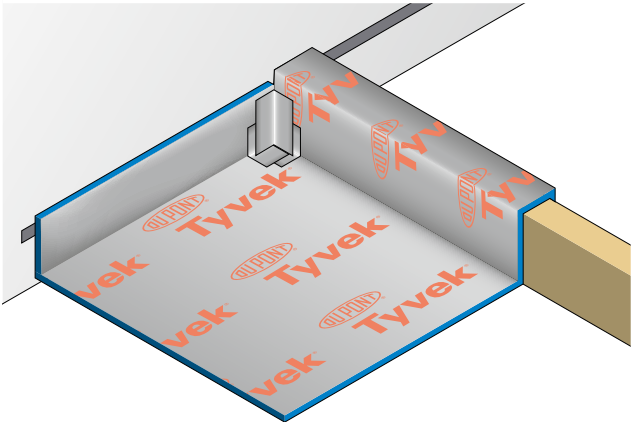


Fig. 36b



Installation

Ideally Tyvek® Supro would be fixed continuously to the underside of the joists, although in most cases this would not be possible as the space beneath the floor would not permit access. The most workable procedure is to wrap the membrane over the joists as in Fig. 35.

Fixing

Tyvek® Supro can be fixed into the tops of the joists using stainless steel staples or galvanised clout nails at approx. 500 mm centres. Fix Tyvek® Supro to the sides of the joists with battens at low level.

Laps and sealing

Laps between each sheet of Tyvek® Supro should be 100mm min. Seal the laps with Tyvek® Acrylic Tape (single-sided) or compress beneath floor boards.

Wall junction - joists parallel

Continue Tyvek® Supro up and over the perimeter joist and lap 100mm against the wall, behind the VCL(if present). Seal Tyvek® Supro to the wall using Tyvek® Butyl Tape (Fig. 36).

Wall junction - joists at right angles

Sealing Tyvek® Supro will be difficult where the joists run into the wall. In order to achieve airtightness, the membrane should be cut, shaped and sealed against the wall and joist. Cuts and edge joints should be made good with Tyvek Acrylic Tape (single-sided) (Figs. 36a/36b).

Additional notes on sealing

Tyvek® Supro should also be sealed against a VCL in the wall using Tyvek® Butyl Tape, Tyvek® Double-sided Tape and/or Tyvek® Acrylic Tape (single-sided).

Service penetrations through the Tyvek® membrane should be sealed using Tyvek® Butyl and/or Tyvek® Acrylic Tape (single-sided).

Internal layers

A further reduction in air leakage can be achieved by installing DuPont™ AirGuard® Control, Smart or DuPont™ AirGuard® Reflective with taped laps directly beneath the internal floor finishes. The membrane can be installed either above or beneath the floor boarding to form a continuous internal vapour control layer and air leakage barrier.

DuPont™ Tyvek® membranes wall and floor applications

SPECIFICATION Suspended timber floor

Breather membrane/insulation support membrane

Shall be Tyvek® Supro as manufactured and sold by DuPont de Nemours (Luxembourg) S.à r.l. and serviced by

DuPont Protection Solutions
BBSP1
Bristol & Bath Science Park
Dirac Crescent
Emersons Green
Bristol
BS16 7FR
Tel: 0117 970 9454/9455

Laying - continuously beneath floor joists
(if access permits)
Unroll Tyvek® Supro at right angles to timber joists and secure with stainless steel staples or corrosion resistant nails. Fix at max. 300 mm centres along each joist.

Laps
Maintain min. 100 mm laps between each sheet and seal with Tyvek® Acrylic Tape (single-sided).

Laying – wrapped over floor joists
Unroll Tyvek® Supro so that it is laid at right angles to the timber joists. Form the membrane over the tops and down the sides of the joists.

Fixing - with battens
Fix Tyvek® Supro with stainless steel staples or corrosion resistant nails at min. 500 mm centres along the tops of each joist. Secure Tyvek® Supro to the sides of the joists at lower level using battens of 19 x 38 mm min.

Fixing - without battens
Fix Tyvek® Supro with stainless steel staples or corrosion resistant nails at max. 300 mm centres along the tops of each joist.

Laps
Maintain min. 100 mm laps between each sheet and seal with Tyvek® Acrylic Tape (single-sided).

Wall junction
Bond Tyvek® Supro to the wall AVCL with Tyvek® Butyl Tape, ensuring overlap of 100 mm min. If cutting around joists make good to cuts and joints using Tyvek® Acrylic Tape (single-sided) or Tyvek® FlexWrap NF.

Sealing – additional notes
Service penetrations through the Tyvek® membrane should be sealed using Tyvek® FlexWrap EZ.



DuPont™ AirGuard® AVCL's

For energy efficiency (airtightness) & condensation control

Warm side of the wall and ceilings
Air and vapour control layer (AVCL) membranes:

- AirGuard® Control
- AirGuard® Reflective
- Tyvek® AirGuard® Smart
- AirGuard® A2 FR fire retardant
(see fire and smoke section for more details)

Useful step by step installation guides and videos are available from the DuPont™ Tyvek® Building Knowledge Centre and our web sites:

www.building.dupont.co.uk
www.construction.tyvek.co.uk
www.energy-efficiency.dupont.com

Important:- All building regulations should be checked first to ensure compliance, especially with respect to fire performance

DuPont™ AirGuard® AVCL's - Wall Applications

To compliment Tyvek® Reflex with a low emissivity internal membrane DuPont has developed DuPont™ AirGuard® Reflective - a completely airtight vapour control layer (VCL) that will also improve the wall's thermal performance. DuPont™ AirGuard® Reflective is designed to provide effective control against interstitial condensation both by diffusion and by convection. The membrane will reduce convective heat loss through the wall construction as well as retaining heat by reflecting it back in.

Installing DuPont™ AirGuard® Reflective behind a plasterboard internal lining will provide the following benefits:

- **Airtightness**
- **Vapour Control**
- **Thermal comfort**

Airtightness

Heat loss by convection isn't something that is highlighted by a standard U-value calculation, but is a significant cause of energy loss nonetheless. As we progress into the future with more energy efficient and sustainable building methods we are becoming more aware of the shortcomings of uncontrolled air leakage. Compliance with building regulations and technical standards is demonstrated by successful pressure testing in accordance with procedures given in Technical Standard 1 of the ATTMA (Air Tightness and Measurement Association).

As it currently stands in the UK, it is quite common for our buildings to be achieving air leakage levels of between and 5m3/hr/m2@50Pa (maximum - Scotland is 7m3/m2/hr), which is clearly better than the 10m3 limit stipulated by Building Regulations. Even so, the UK is seriously lagging behind other European countries whose upper limits are very often Passive House at below 1m3.

Uncontrolled air leakage occurs through gaps between and around insulation layers and through hairline cracks in plasterboard linings. These invariably occur during the building drying out process, but are also caused by settlement and thermal movement over the life of the building. Any layer in the building envelope where total continuity is not achieved is a potential weak point.

Vapour Control

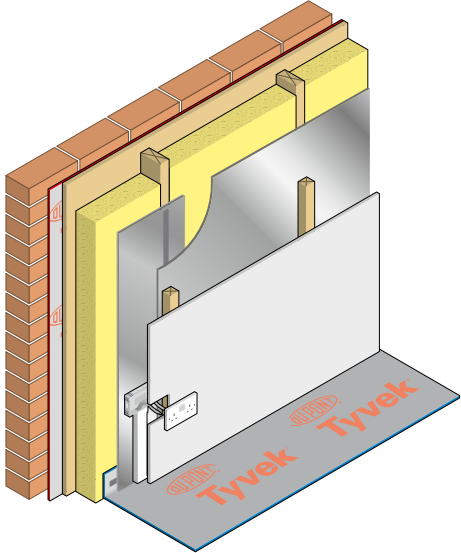
DuPont™ AirGuard® Reflective offers high resistance to the passage of water vapour both by diffusion and convection. When installed continuously with all laps and penetrations sealed, the membrane will provide effective condensation control for all building types. This includes those of high humidity class, eg. swimming pools, textile factories, etc.

Thermal comfort

The metallised face of DuPont™ AirGuard® Reflective presents a low emissivity surface on the internal side of the wall construction. When used with a small airspace the membrane will reflect internally generated heat back into the building providing a back-up to traditional insulation. This reduction in heat transmission allows the airspace thermal resistance to be increased to 0.67 m²K/W. This will improve to the overall U-value of the wall system thus helping to reduce heating costs.

Page 43 shows likely U-values to be expected when using DuPont™ AirGuard® Reflective as the VCL in metal frame wall systems with standard stud sizes. Figures for standard breather membrane vs Tyvek® Reflex also included.

Fig. 28 – DuPont™ AirGuard® Reflective installation



DuPont™ AirGuard® Reflective General Notes

Orientation

For airtightness and vapour control, the orientation of DuPont™ AirGuard® Reflective is unimportant, but to utilise the membrane's thermal capacity its reflective surface must always face into an airspace. The preferred method is to install it with the reflective side facing into the building and then to fix a standard 25 mm batten over the membrane as described in the installation notes under batten space.

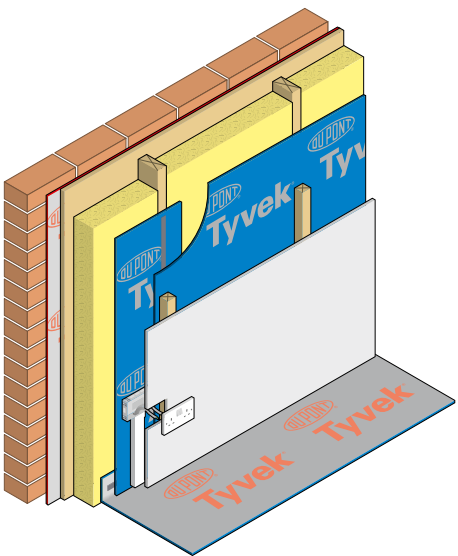
Continuity and sealing

As a vapour resistant and airtight membrane it is important to ensure DuPont™ AirGuard® Reflective is installed continuously with no breaks or open joints where air leakage can occur. All laps, penetrations and cuts in the membrane should be sealed with Tyvek® Butyl Tape may also be used with the batten to seal fixing penetrations.

DuPont™ AirGuard® Control General Notes

Installing DuPont™ AirGuard® Control as part of the internal lining will minimise uncontrolled convected heat losses through the building fabric. The objective is to provide a continuous barrier to air movement around the habitable space that is in contact with the inside of the thermal insulation layer. This includes separating walls and the edges of intermediate floors.

Fig. 32 – DuPont™ AirGuard® Control installation



DuPont™ AirGuard® Control has been specifically developed for use as an air leakage barrier (ALB), but will also contribute in controlling the passage of vapour through a structure. Its use is particularly applicable in 'vapour open' wall constructions where external layers are of low vapour resistance.

Installing DuPont™ AirGuard® Control as the AVCL will ensure that the overall 'breathability' of the construction is maintained with the correct balance of vapour resistances between internal and external layers. (See page 18 - The '5 times rule')

Composition

DuPont™ AirGuard® Control is composed of a layer of spunbonded polypropylene with a polyolefin coating.

Strength

DuPont™ AirGuard® Control is rot proof and has a nail tear resistance of 210N. It is an extremely durable material.

Note: When installing DuPont™ AirGuard® Control the installation procedures for DuPont™ AirGuard® Reflective should be followed. Total continuity of DuPont™ AirGuard® Control is paramount to achieve successful pressure testing at 50 Pa.

[AirGuard® Reflective Installation Sheet](#)

[AirGuard® Control Installation Sheet](#)

DuPont™ AirGuard® AVCL's - Wall & Ceiling Applications

DuPont™ Tyvek® AirGuard® Smart

DuPont™ Tyvek® AirGuard® Smart is a strong and lightweight flexible membrane for use as an internally applied airtight vapour control layer (AVCL).

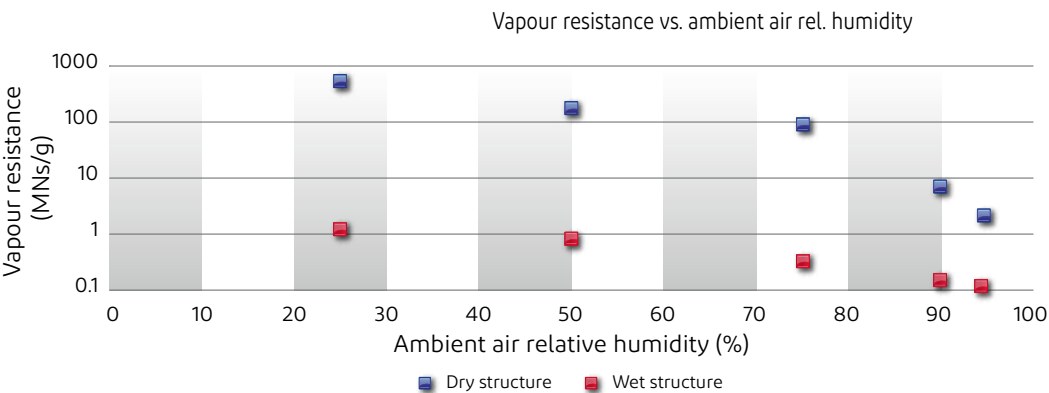
Outstanding properties:

- Extreme vapour resistance range from 1 MNs/g to more than 182 MNs/g, (s_d value 0.2m to 35m), therefore highly adaptable → one of the widest vapour resistance spans known in the market
- Combines drying-out and vapour control function in one layer
- High drying-out potential = maximum protection against structural damage
- High tensile strength offering superior insulation support/retention
- Very robust - offering versatility in site work
- Airtight
- Transparent allowing the timber members to be easily located for fixing
- Easy to install - suitable for use in roof or wall constructions

How DuPont™ Tyvek® AirGuard® Smart works

The graph shows 2 extreme examples:

1. Wet (100%) and 2. dry (0%) building envelope structure and corresponding vapour R_s (resistance) - depending on ambient air relative humidity. The actual vapour R_s is a combination of both the moisture content of the building envelope and relative humidity of the internal air. DuPont™ Tyvek® AirGuard® Smart provides traditional vapour control to the diffusion of vapour from the building interior, whilst offering a high drying-out potential of built-in moisture back into the building.



What happens just after a new build construction or after renovation?

New construction

Condition just after completion: Moisture is confined within the building envelope; damp timbers, insulation, etc, due mainly to wet building processes.

A new-build property will very often have a high relative humidity due to the rapid drying of the building fabric. Hence after completion, the owner has to adequately ventilate the building interior to expel the moisture rather than allow it to migrate through the construction where it can condense and cause harm. If needed the DuPont™ Tyvek® AirGuard® Smart allows moisture within the building fabric to migrate back into the building. Where the moisture content within the structure is high the vapour resistance of DuPont™ Tyvek® AirGuard® Smart will always be low. This will allow the structural elements and the insulation to dry out towards the warm side of the building, in addition to the normal process of vapour diffusion through the external DuPont™ Tyvek® breather membrane.

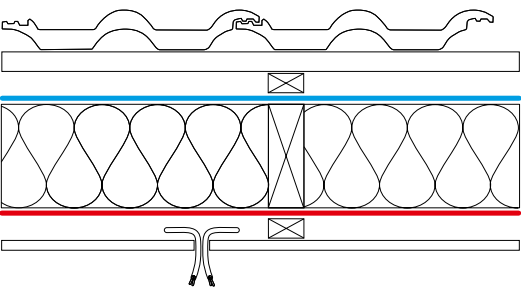
Renovation

Condition just after completion: Building structure and insulation dry after brief humidity stabilisation.

In the case of a dry building structure, DuPont™ Tyvek® AirGuard® Smart acts as a traditional AVCL, providing effective condensation control and airtightness. Even in temporarily high air humidity zones water vapour diffusion is reduced*. The vapour resistance of DuPont™ Tyvek® AirGuard® Smart will be between 1 MNs/g to more than 182 MNs/g, (s_d value 0.2m to 35m). The migration of newly generated moisture through the construction will be significantly reduced.

Installation: DuPont™ AirGuard® AVCLs

1 - Service Void

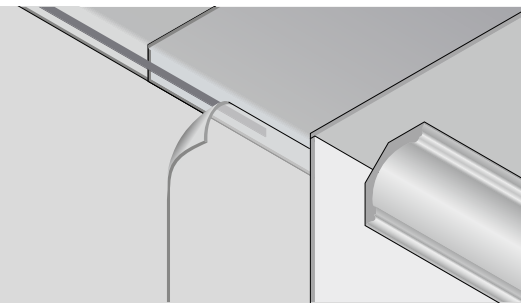


Detailing

The integrity of a DuPont™ AirGuard® AVCL is essential for it to perform as an effective vapour control layer and air leakage barrier. The internal lining (plasterboard, etc.) may be fixed directly through the membrane if required. However, for maximum efficiency and best practice the internal lining can be fixed via battens to minimise penetrations through the membrane. Installing battens will also create a services void for wiring and pipework (Detail 1). (See also Fig.28 & Fig.32)

Continuity of the membrane should be maintained at adjacent walls, floors and roofs with Tyvek® Butyl Tape (Detail 2)

2 - Wall to ceiling junction

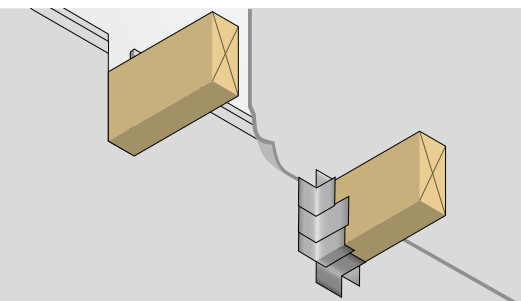


Wall - upper storey floor joists

Note: To ensure continuity, the DuPont™ AirGuard® AVCL must be installed before installation of plasterboard to the ceiling and boarding to the upper floors.

Extend the DuPont™ AirGuard® AVCL above ceiling/ floor joists by a minimum of 100mm. Cut and dress the membrane around all joists and make good/seal with Tyvek® 2060B Tape. Bond the membrane to upper storey sheets using Tyvek® Butyl Tape (Detail 3).

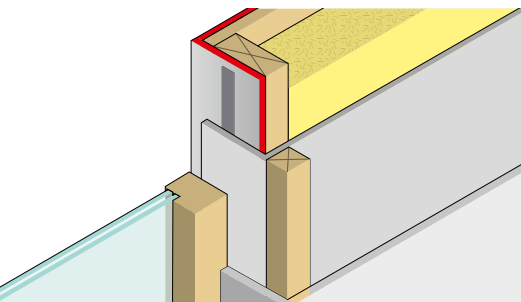
3 - Penetrations



Penetrations

Penetrations through the DuPont™ AirGuard® AVCL should be kept to a minimum and any that are made should be sealed. Penetrations for pipework, wiring and electrical sockets should be sealed with Tyvek® 2060B Tape, Tyvek® Metallised Tape or DuPont™ FlexWrap EZ (Detail 3).

4 - Window/door frame sealing



Windows/doors

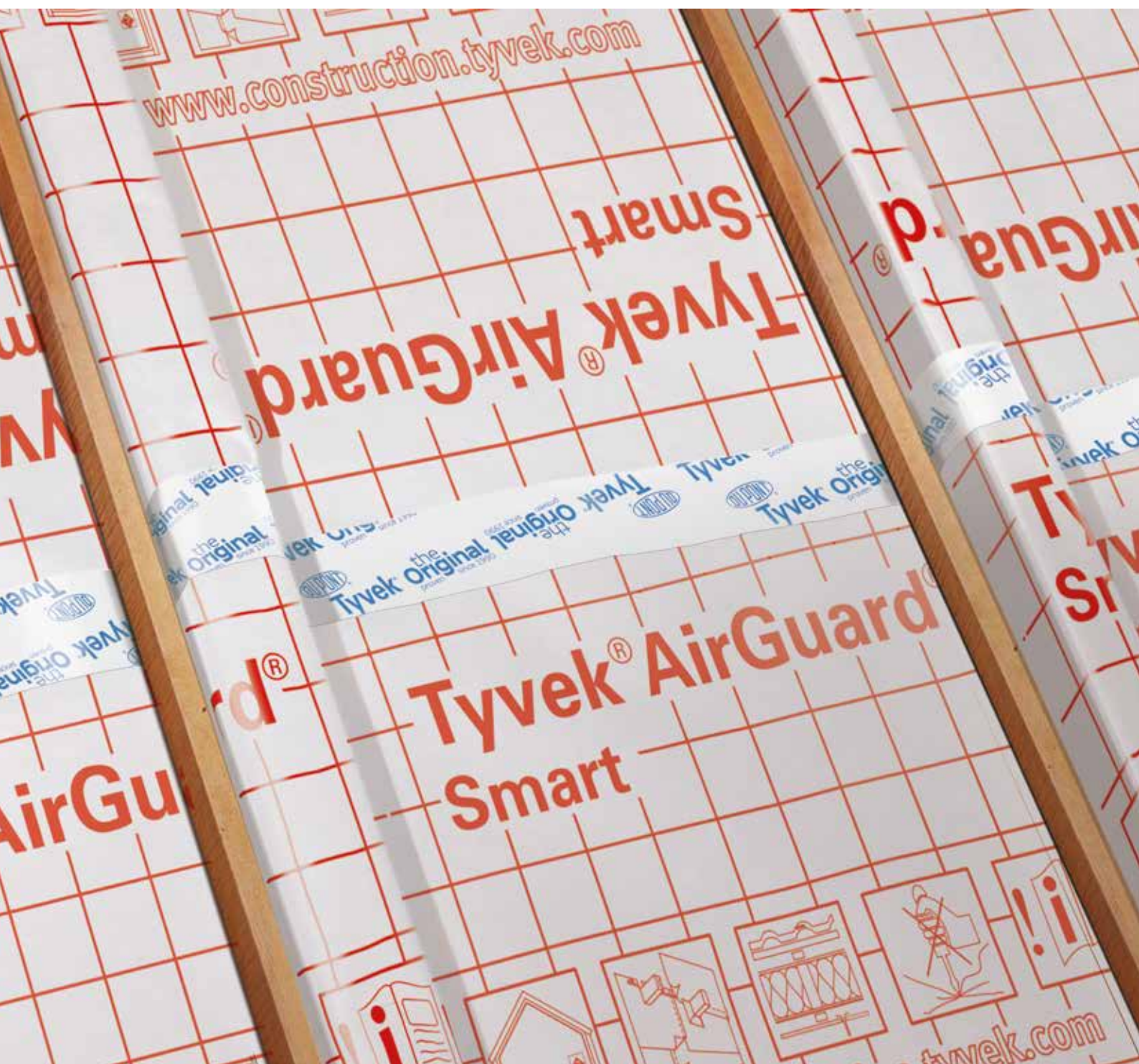
The DuPont™ AirGuard® AVCL should be made vapour and convection tight at all window and door openings. The membrane should be dressed neatly into the reveal and sealed to the frame with Tyvek® 2060B Tape or Tyvek® Double Sided Acrylic Tape. The membrane may be compressed by the frame if the window/door unit is to be fitted retrospectively (Detail 4). The membrane should be made good at door and window corners with Tyvek FlexWrap EZ.

Damage

If a DuPont™ AirGuard® AVCL is abraded or punctured in any way the damaged area should be made good with Tyvek® 2060B Tape or Tyvek® Metallised Tape. Extensive damage should be covered with a patch made from the same material and sealed with Tyvek® 2060B Tape or Tyvek® Metallised Tape.

Tyvek® AirGuard® Smart

Air & vapour control layer with variable vapour resistance



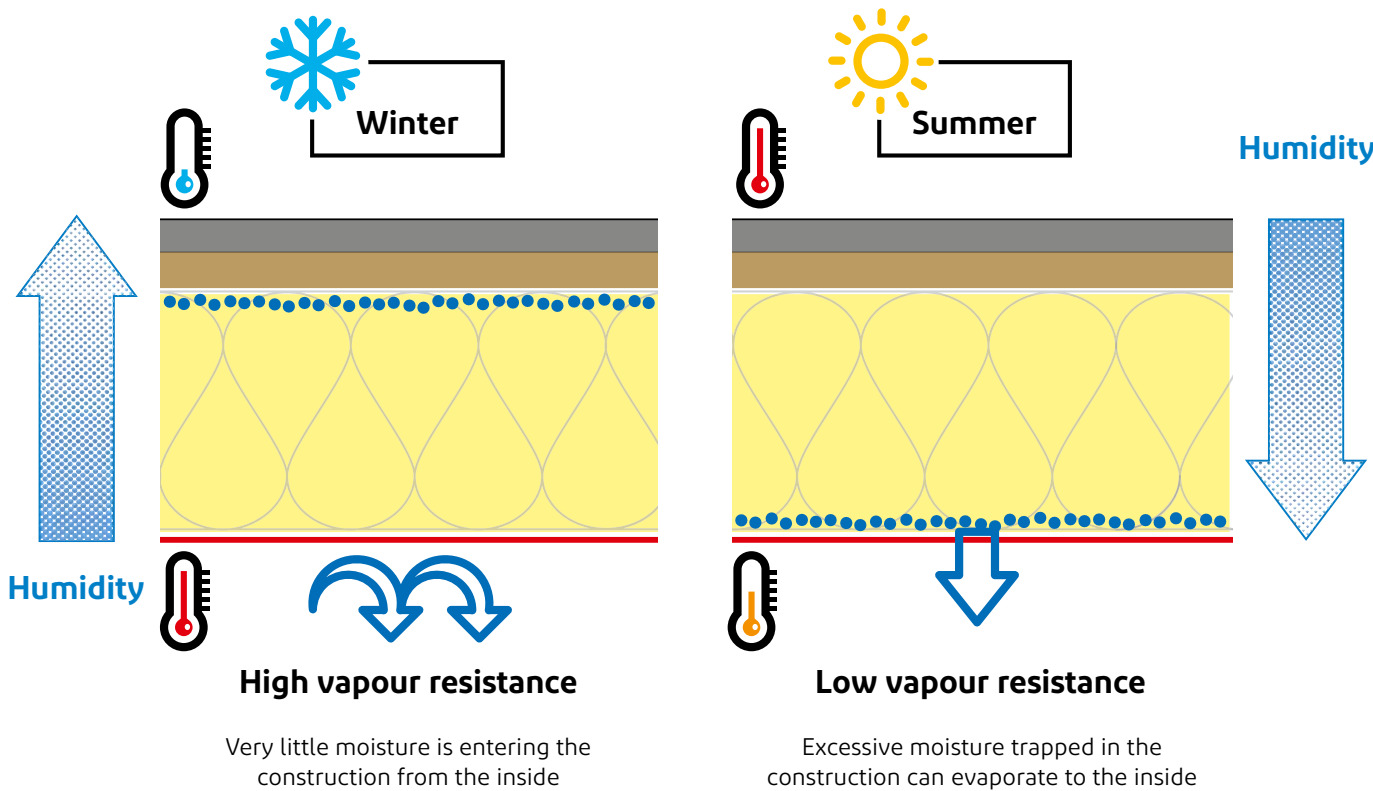
How Tyvek® AirGuard® Smart works

Tyvek® AirGuard® Smart prevents structure damage and loss of insulation efficiency by smartly adapting to various moisture conditions and regulating the humidity in building elements.



Tyvek® AirGuard® Smart adapts:

- to allow faster evacuation of built-in humidity in new construction elements (e.g.: wet rafters)
- to avoid humidity infiltration from the living space into the construction elements during winter
- to allow moisture trapped in the structure to escape to the building interior



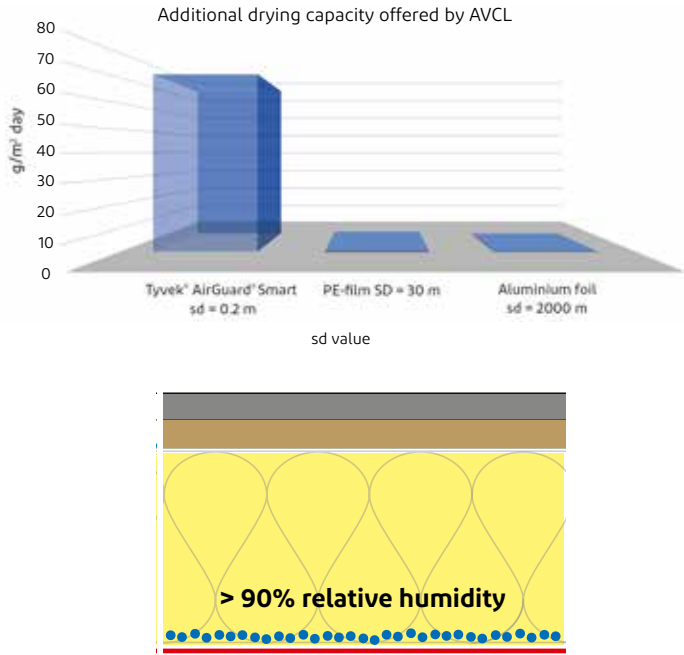
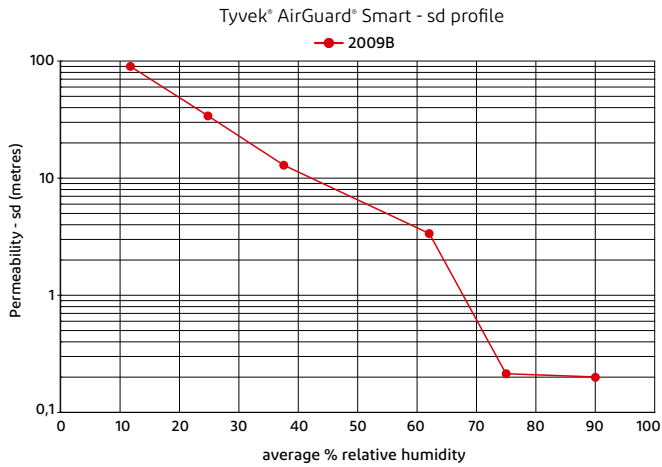
Typical applications	Benefits
New construction	Reduced drying out time. Drying out by moisture migrating back into the building
Renovations from the exterior	Allows continuous installation of AVCL from the outside without risking condensation to the upper side of rafters
Flat and pitched roofs with HR (High Resistance) underlay	Only an adaptive AVCL allows drying out in this type of application
Use a standard AVCL *	




Why Tyvek® AirGuard® Smart?

- Reduced drying out time
- Durability, health and longevity of buildings
- Greater energy efficiency
- Additional drying capacity for unplanned humidity infiltration
- Enhanced interior comfort
- Trusted Tyvek® brand: robustness and durability
- Part of the Tyvek® system

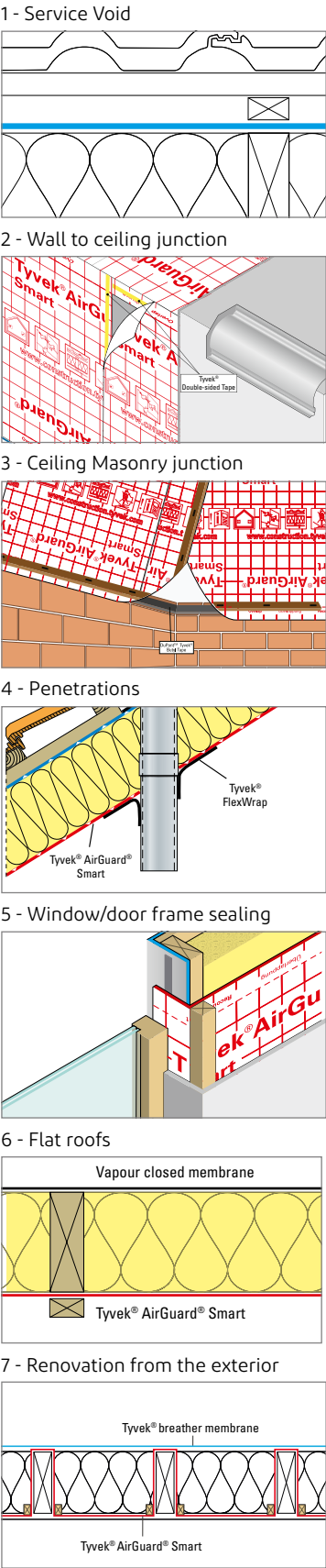
Variable sd AVCL: the broader the range, the more efficient the humidity control



Specifications 	
Material	Tyvek® with polymeric coating
Style	2009B
Watertightness acc. to EN13859-1 based on 1928 (A)	W1
Roll size/weight	1.50 m x 50 m / 8 kg
Reaction to fire	E
Mass per unit area	92 g/m²
Water vapour transmission range (s _d -value)	35 m (dry environment) / 0.2 m (humid environment)
Temperature resistance	from -40 °C to +80 °C
Maximum tensile force (MD/XD)	390/380 N/50mm
Resistance to tearing (MD/XD)	75/65 N
Air permeability (ISO 5636/5)	2000 s



Installation Guidelines



Tyvek® AirGuard® Smart is suitable for installation into many types of construction element; timber frame/SFS wall systems, suspended floor applications, flat roofs, cold and warm pitched roofs. Applications range from new-build, right through to existing problematic projects where refurbishment work is needed.

Detailing: The integrity of Tyvek® AirGuard® Smart is essential for it to perform as an effective vapour control layer and air leakage barrier. The internal lining (plasterboard, etc.) may be fixed directly through the membrane if required. However, for maximum efficiency the internal lining can be fixed via battens creating a service void which will also help to minimise penetrations (Fig. 1).

Continuity of the membrane should be maintained at adjacent walls, floors and roofs with Tyvek® Butyl Tape or Tyvek® Double-sided Tape (Fig.2).

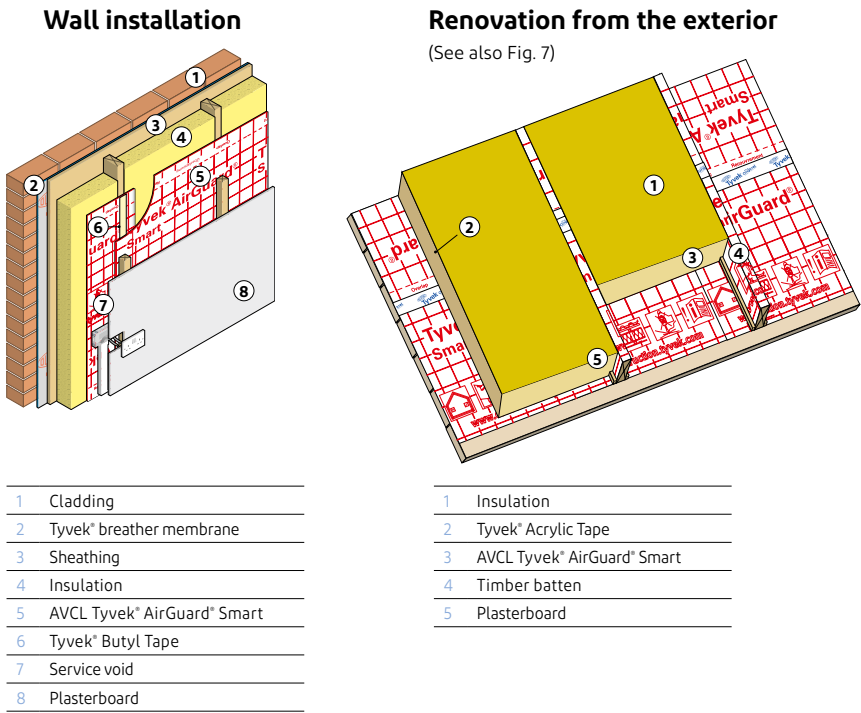
Ceiling Masonry junction: Tyvek® Butyl Tape may be used to seal Tyvek® AirGuard® Smart to masonry surfaces. Tyvek® Butyl Tape may also be used to seal fixing points. Note: Where practicable, timber battens are recommended to fix Tyvek® AirGuard® Smart to any adjacent surfaces (Fig. 3).

Penetrations and making good: Penetrations through the membrane should be kept to a minimum and any that are made should be sealed. All membrane laps should be sealed with Tyvek® Acrylic Tape, and penetrations for pipework, wiring and electrical sockets should be made good with Tyvek® FlexWrap (Fig. 4).

Windows/doors: Tyvek® AirGuard® Smart should be installed convection tight at all window, door and hatch openings. The membrane should be sealed with Tyvek® Butyl Tape or tucked in and compressed by the frame (Fig. 5) Corners are best sealed with Tyvek® FlexWrap.

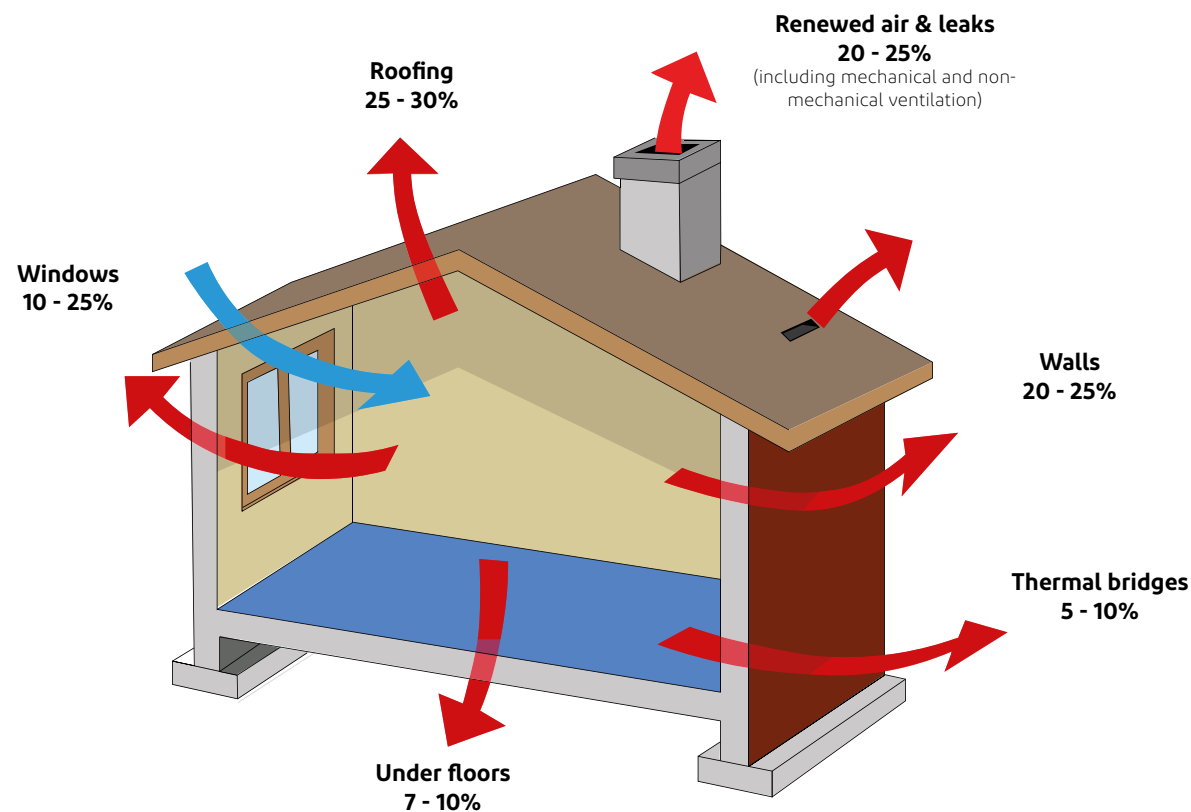
Flat roofs: A typical application for Tyvek® AirGuard® Smart is in flat roofs (Fig. 6).

Roof renovation from the exterior: In specific cases Tyvek® AirGuard® Smart may be installed from above, with the membrane installed 'up-and-over the rafters/joists (Fig. 7). For information on this installation please contact our BKC Technical Office: 0117 970 9454/9455



Heat loss in buildings

In new (energy efficient) houses:
Sources of heat loss



Graph source: IFSB Luxembourg

Natural ventilation within buildings will always be needed to provide the occupants with fresh air. As well as to extract moisture, and to provide combustion air for unflued appliances, it will ensure the safety and comfort of occupants by reducing potential build-up of VOC's. Ventilation should be controllable, but even so it will contribute to a higher air exchange and consequently heat from the building via this mechanism will be lost. When planning the airtightness target, it is always worth taking into consideration that ventilation can account for up to 25% of the heat lost and therefore aiming for an efficient airtightness level is good forward thinking. In energy-efficient buildings it is important to strike a balance between airtightness, ventilation and thermal efficiency to establish the ideal indoor environment for the occupants. Heating and cooling costs can be reduced and mould and decay within the structure can be prevented.

Sealing penetrations to minimise the spread of fire and smoke

Important:

Please take care to avoid leaving any gaps (pipework, ducting and cable penetrations, open joints, joists, doors and windows) that could allow smoke and/or fire to permeate the structure by using the appropriate tapes or other sealing products.

Please see pages 48 to 53 for our new fire retardant system, including:

DuPont™ Tyvek® FireCurb® breather membrane, and DuPont™ AirGuard® A2 FR fire retardant AVCL membrane



Fire & Smoke System

- DuPont™ Tyvek® FireCurb® breather membrane
- DuPont™ AirGuard® A2 FR AVCL
- DuPont™ AirGuard® FR System Tape
- DuPont™ Tyvek® Metallised Tape

When the Safety of Others and Long Term Building Performance is Essential

DuPont™ AirGuard® A2 FR AVCL Fire Retardant Membrane

– for internal lining of wall, ceiling and roof systems

DuPont™ Tyvek® FireCurb® Breather Membrane

– for external lining of wall systems

Class A2 Fire Retardant AVCL Membrane DuPont™ AirGuard® A2 FR

Airtight Vapour Control Layer for use within the internal lining of roof, ceiling and wall systems



**FIRE
RETARDANT**

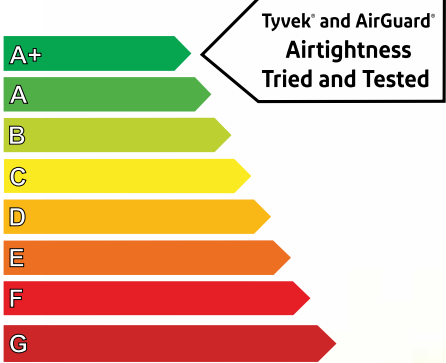
DuPont™ AirGuard® A2 FR AVCL: a Fire Retardant Airtight Vapour Control Layer for use within the internal lining of roof, ceiling and wall systems. Enhancing the building fabric in terms of airtightness, energy efficiency and moisture management, improving indoor air quality and providing exceptional fire safety to the building and its occupants.

Surpassing the Fire Regulations

Today the fire performance of materials used in buildings is under closer scrutiny than ever before and the regulations continue to be updated. DuPont has introduced a step change in their building membranes offering: a fire retardant AVCL with European Fire Classification A2.

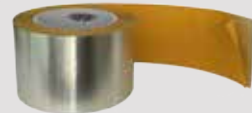
Membrane & Tape System – Independent Classification: A2-s1,d0

For DuPont™ AirGuard® A2 FR AVCL to provide effective airtightness and vapour control it is crucial that all laps, junctions and penetrations are sealed. In order to give assurance that a complete system is ‘fire-safe,’ a full system test, including horizontal and vertical lap sealing with DuPont™ AirGuard® FR System tape has been successfully tested according to EN 13501-1 at the Prüfinstitut Hoch → Classification Report, KB-Hoch-200148-5, 18.08 2021.



DuPont™ AirGuard® A2 FR AVCL & tape system advantages at a glance

- Fire-retardant
- Reaction to fire: A2-s1, d0 to EN 13501-1: 2007+A1:2009
- DuPont™ AirGuard® A2 FR AVCL and DuPont™ AirGuard® FR System tape



DuPont™ AirGuard® FR System Tape

- Tested and classified for free-span, on mineral wool slab, gypsum plasterboard or fibre cement board
- Fire Classification surpasses all national building regulations and standards for construction materials used in walls in the UK and Ireland

- Suitable for all building types, heights and proximities
- High vapour resistance, limiting interstitial condensation
- Suitable for high humidity buildings, such as swimming pool halls etc
- Thermal benefit; low emissivity/reflective surface
- 100% Airtightness
- Extremely robust
- Exceptional tear and tensile strength characteristics
- 25 year warranty for the DuPont™ AirGuard® A2 FR AVCL membrane



THE DUPONT™ TYVEK®
BUILDING KNOWLEDGE CENTRE
www.building.dupont.co.uk

DuPont™ Tyvek® FireCurb® breather membrane advantages at a glance

- Compliance with national Fire Regulations & Standards for use in hi-rise buildings
- Reaction to fire: B-s1,d0
- Self-extinguishes when ignited - limits propagation of flames
- Class W1 essential water resistance to EN 13859
- Halogen-free flame retardant coating considerably limits the formation of droplets and reduces smoke
- Greater safety during and after installation
- Long term investment protection
- Has all the tried, tested and trusted properties Tyvek® is known for
- Strong technical support for all Tyvek® and AirGuard® products

DuPont™ Tyvek® FireCurb® breather membrane

breather membrane for use in the external lining of wall systems



FLAME
RETARDANT

Tyvek® FireCurb® breather membrane: a flame retardant breather membrane for buildings based on a new patented technology, enabling a Euroclass B (EN 13501-1) that potentially saves lives and could prevent costly damages.

The building breather membrane that limits the propagation of flames


DuPont introduced a new level of building protection with the flame retardant breather membrane Tyvek® FireCurb®. When flames meet Tyvek® FireCurb®, they literally stop, die down ... and go out. The membrane includes all of the well-known properties of Tyvek®, adding flame retardancy for even more comprehensive protection of walls.

Tyvek® FireCurb® breather membrane advantages at a glance

- Compliance with national Fire Regulations & Standards for use in hi-rise buildings
- Reaction to fire: B-s1,d0
- Self-extinguishes when ignited - limits propagation of flames
- Halogen-free flame retardant coating considerably limits the formation of droplets and reduces smoke
- Greater safety during and after installation
- Long term investment protection
- Includes all durable Tyvek® characteristics essential for energy efficient and condensation free buildings:
 - Class W1 water resistance to EN 13859
 - Vapour resistance meets BS 5250 guidance for breather membranes (<0.6 MN.s/g)
 - **IMPORTANT:** Not all fire retardant breather membranes, on the market, reach the required sd and water vapour resistance standard <0.6MN.s/g




DuPont™ AirGuard® A2 FR AVCL

Properties 	Nominal
Style name and D code	5816X (D Code:- D15561632)
Roll size	1.2m x 50m
Thickness	0.15 mm
Mass per unit area	165 g/m²
Composition	Laminate of glass fibre-mesh with lacquered Aluminium foil
Reaction to fire* (EN13501-1)	A2-s1,d0 (membrane)
Reaction to fire* (EN13501-1)	A2-s1,d0 (membrane & AirGuard® FR System tape)
Water vapour transmission (Sd)	4.900 m
Water vapour resistance	24.000 MN.s/g
Emissivity	0.05
Thermal resistance (with airspace)	Walls: 0.66 m²K/W / Ceilings: 0.45 m²K/W
Water tightness (EN1928)	Pass (Type A)
Tensile force MD/XD	800/800 (N/500)
Nail tear resistance MD/XD	170/150 (N/50 mm)

Tested freehanging & affixed on underlaying materials with EN13501-1 fire class A1 or A2-s1, d0.

IMPORTANT: To compliment this product, a flame retardant breather membrane should be used on the external side of the wall system. For this purpose, we would recommend you use DuPont™ Tyvek® FireCurb®. Please see www.flameretardant.tyvek.com

DuPont™ Tyvek® FireCurb®

Properties 	Nominal
Style name and D code	2066B (D Code:- D15085129)
Dimensions / Weight	1.5 x 50 m / 5.5 kg per roll
Composition	Flash-spun-bond HDPE with flame retardant coating
Reaction to fire*	(EN13501-1) B-s1,d0
Temperature resistance	-40 to +100° C
Water vapour transmission (Sd)	0.015 m
Water vapour resistance	0.075 MN.s/g (less than 0.6 MN.s/g to BS 5250:2011)
Mass per unit area	68 g/m²
Functional layer thickness	175 µm
CE-Certificate of Conformity	yes (0799-CPD-128)

*(if installed freehanging, on mineral wool & cementitious boarding--> B-s1,d0 , if installed onto wood --> D-s2,d2)

IMPORTANT: To compliment this product in roof, ceiling and wall systems, a fire retardant air and vapour control layer (AVCL) should be used within the internal lining. For this purpose we would recommend you use DuPont™ AirGuard® A2 FR.

To achieve optimal airtightness, we recommend the use of the following adhesive accessories.

Tyvek® Acrylic Tape

Roll size:
75 mm x 25 m



AirGuard® FR System Tape

Roll size:
75 mm x 25 m



Tyvek® Butyl Tape

Roll size:
20 mm x 30 m or
50 mm x 30 m



Tyvek® Double-sided Tape

Roll size:
50 mm x 25 m



Tyvek® FlexWrap NF/EZ (Check for maximum tape width permitted)

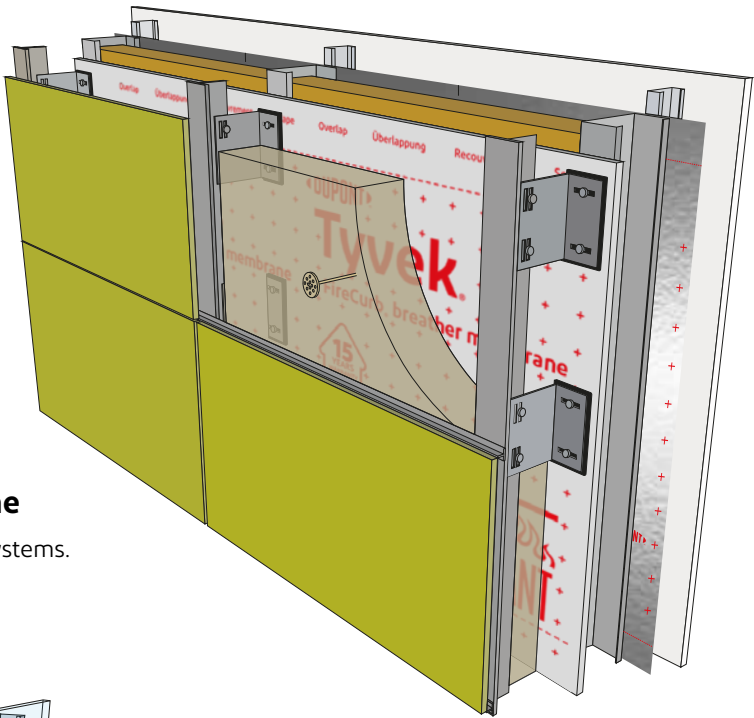
Roll size Tyvek® FlexWrap NF:
15 cm x 23 m



Roll size Tyvek® FlexWrap EZ:
60 mm x 10 m

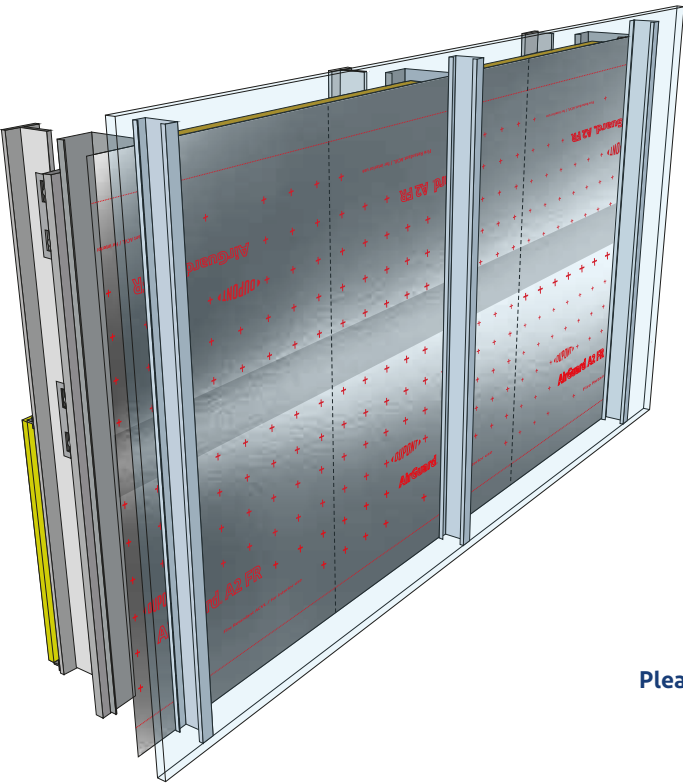


For more detailed information on all our tapes and accessories please refer to pages 90 - 97.



DuPont™ Tyvek® FireCurb® breather membrane

Breather membrane for use in the external lining of wall systems.



Class A2 Fire Retardant AVCL Membrane DuPont™ AirGuard® A2FR

Airtight Vapour Control Layer for use within the internal lining of roof, ceiling and wall systems.

Please see Installation Sheets for above two products on our website.

ENHANCED FIRE AND SMOKE PROTECTION

These tried and tested products not only provide exceptional fire and smoke protection and peace of mind for occupants - they also enhance a building's airtightness and air quality while improving energy efficiency and moisture management.

www.FlameRetardant.tyvek.com

www.building.dupont.co.uk

www.energy-efficiency.dupont.com



Detailing around Windows & Doors

- DuPont™ AirGuard® Tape
- DuPont™ Tyvek® Acrylic Tape
- DuPont™ Tyvek® FlexWrap Tapes
- DuPont™ Tyvek® Window/Plastering Tape
- DuPont™ Insta Stik™ Polyurethane Foam Adhesive
- DuPont™ Froth-Pak™ Mini Polyurethane Foam Sealant
- DuPont™ Great Stuff™ Polyurethane Foam Sealant

Useful step by step installation guides and videos are available from the DuPont™ Tyvek® Building Knowledge Centre and our web sites:

www.building.dupont.co.uk
www.energy-efficiency.dupont.com

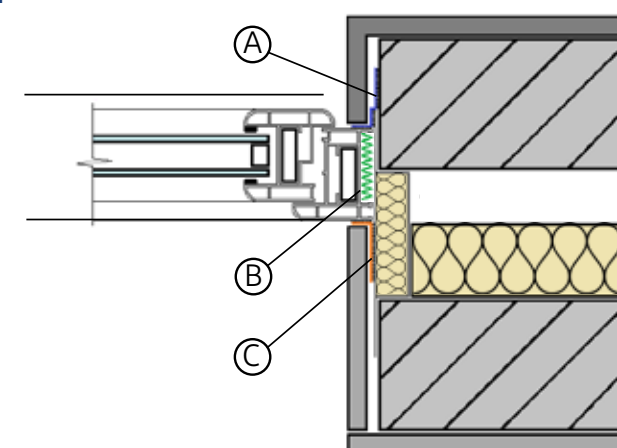
Examples of window configurations for UK and the Republic of Ireland markets

Fig. 1 - Insulated Blockwork cavity wall (partial fill)

- > External render
- > Internal plasterboard on dabs

OUTSIDE

INSIDE



- Ⓐ DuPont™ Tyvek® Window Tape
- Ⓑ DuPont™ Instastik™ Flex (behind frame)
- Ⓒ DuPont™ Tyvek® Window Tape or Tyvek® Acrylic Tape

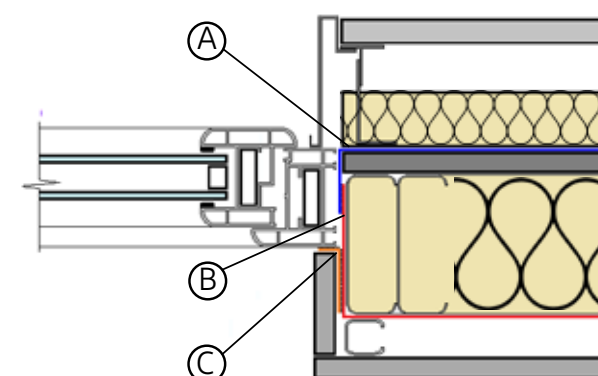
* NOTE: Tyvek® Plastering Tape may be used in areas where render and/or dabs are being applied.

Fig. 2 - SFS Aluminium rainscreen

- > External render
- > Internal plasterboard on dabs

OUTSIDE

INSIDE



- Ⓐ Tyvek® Breather membrane on CP board
- Ⓑ DuPont™ AirGuard® AVCL
- Ⓒ Internal - Tyvek® Tape

Examples of window configurations for UK and the Republic of Ireland markets

Fig. 3 - Timber frame (brick external leaf)

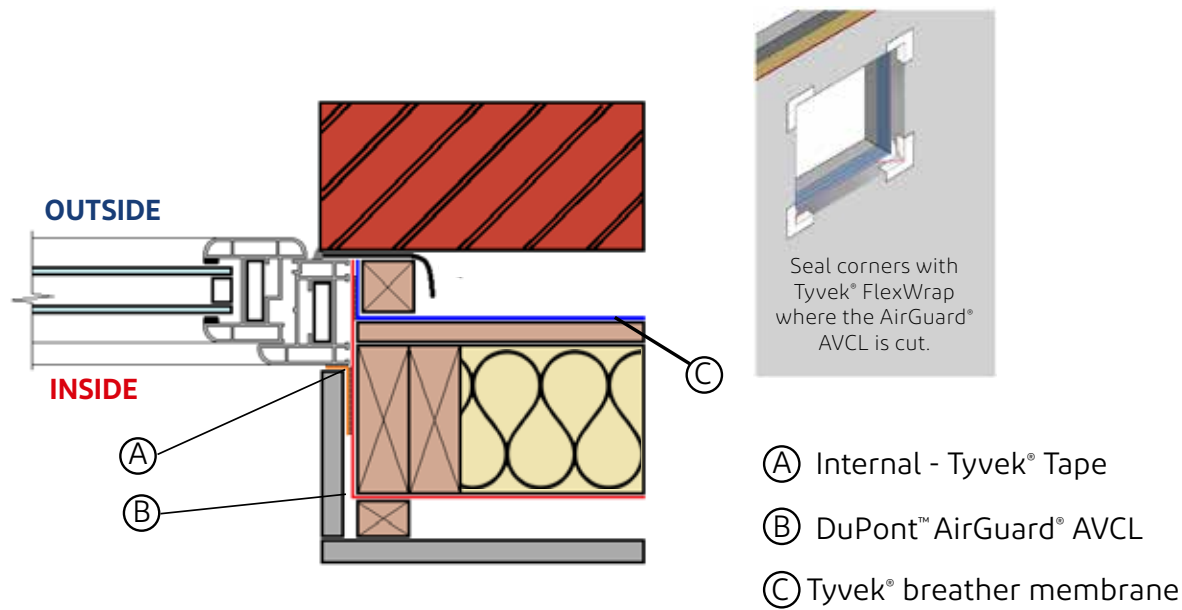
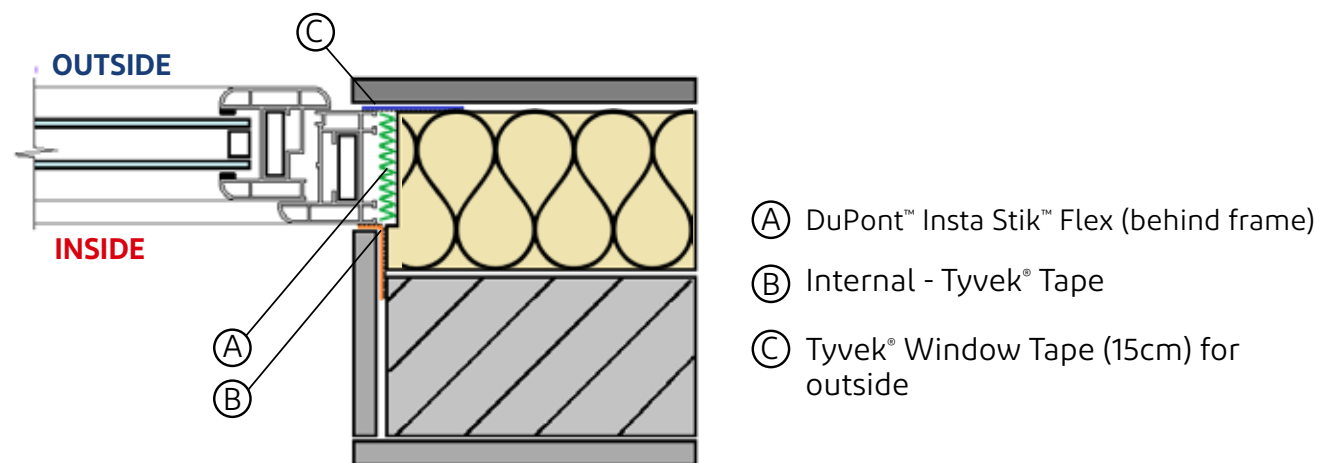


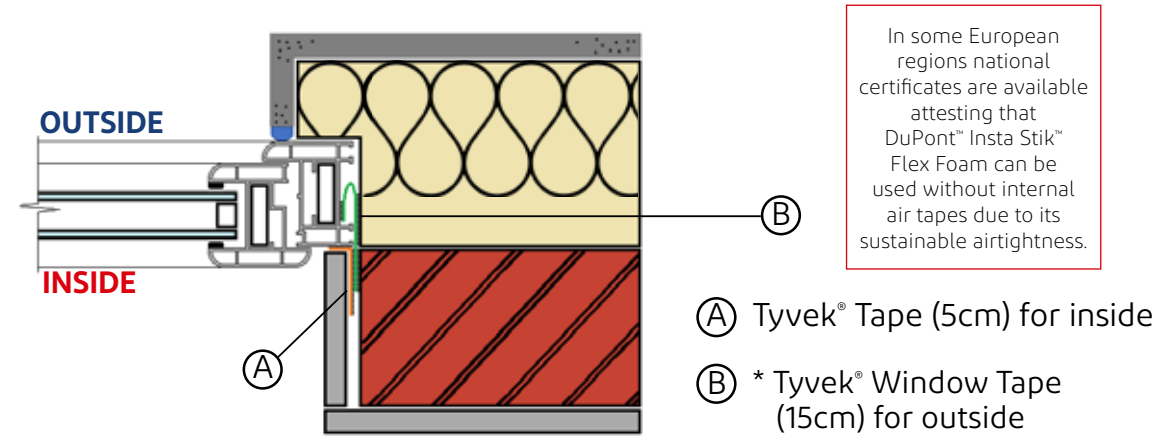
Fig. 4 - External wall insulation (EWI systems / ETICS)



Examples of window configurations across Europe

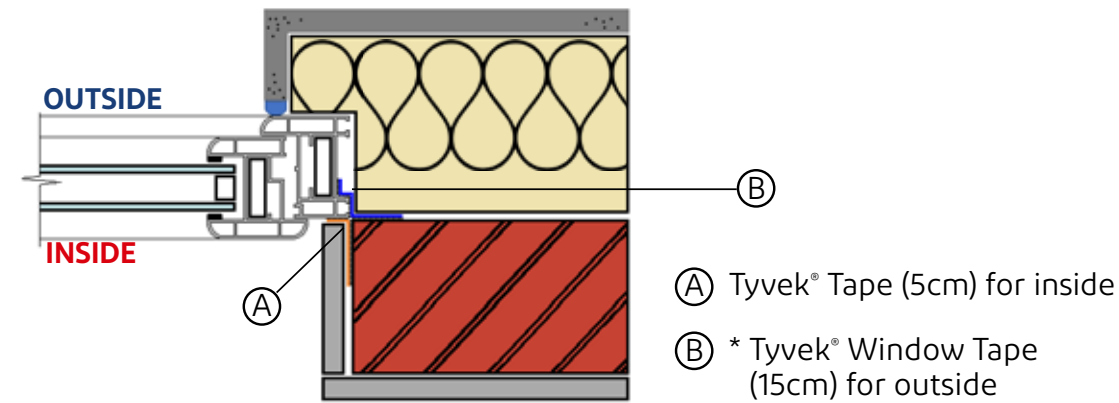
New Buildings (Passive houses): Windows inside the insulation layer

Fig. 5



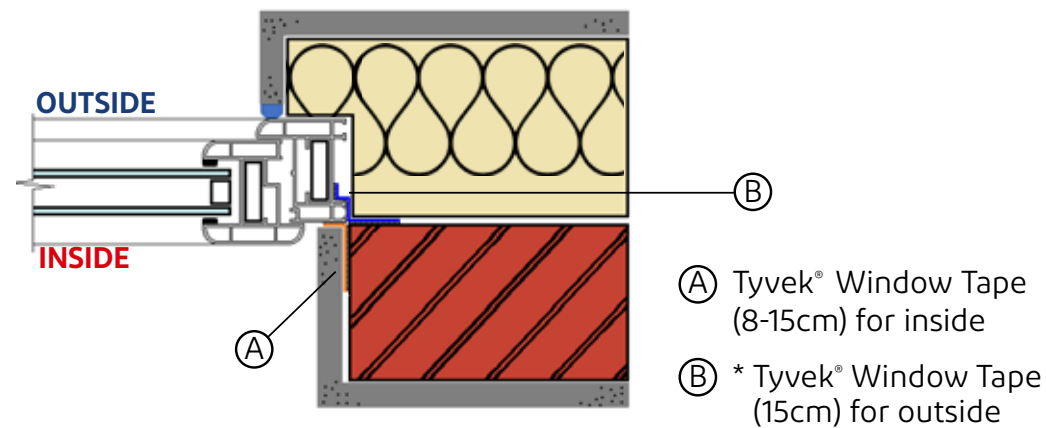
* NOTE: Some external sealing provisions may not be necessary if the external insulation is being fitted immediately after the window unit.

Fig. 6



* NOTE: Some external sealing provisions may not be necessary if the external insulation is being fitted immediately after the window unit.

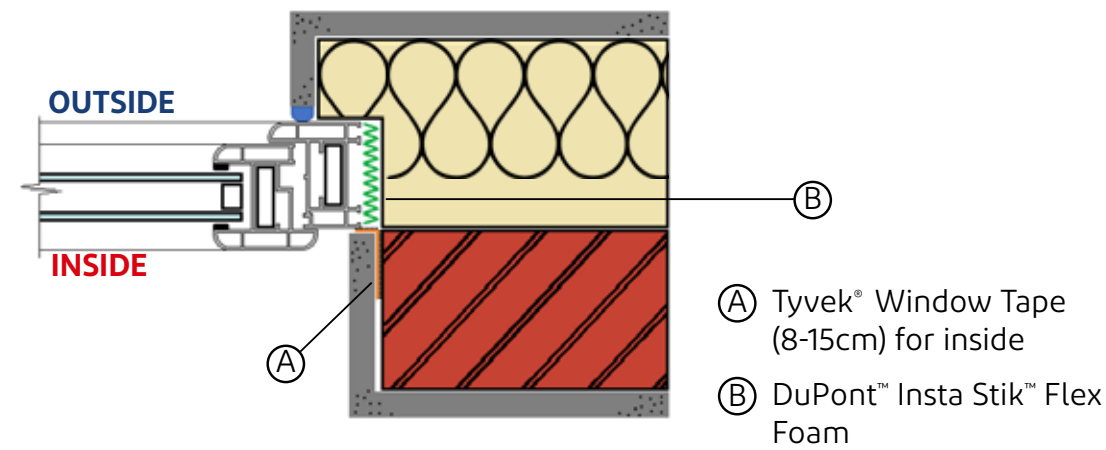
Fig. 7



* NOTE: Some external sealing provisions may not be necessary if the external insulation is being fitted immediately after the window unit.

Examples of window configurations across Europe

Fig. 8



* NOTE: Some external sealing provisions may not be necessary if the external insulation is being fitted immediately after the window unit.

Fig. 9

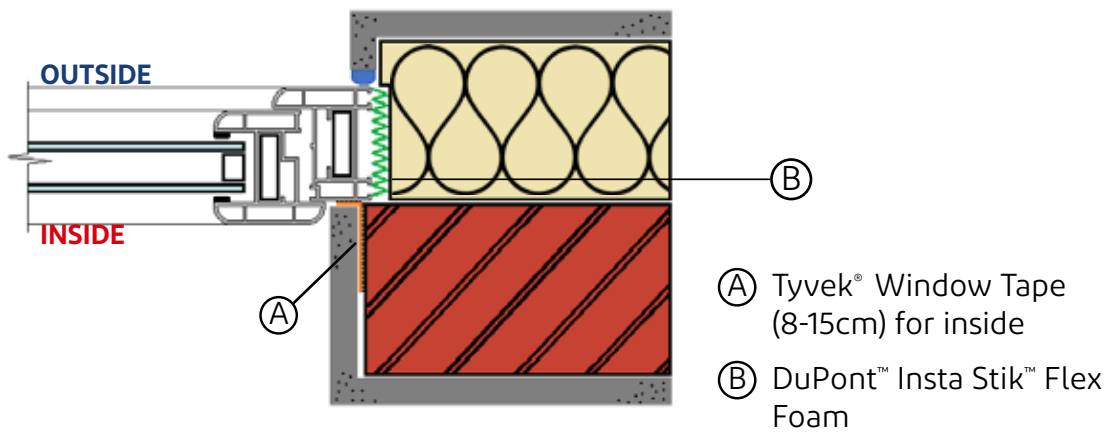
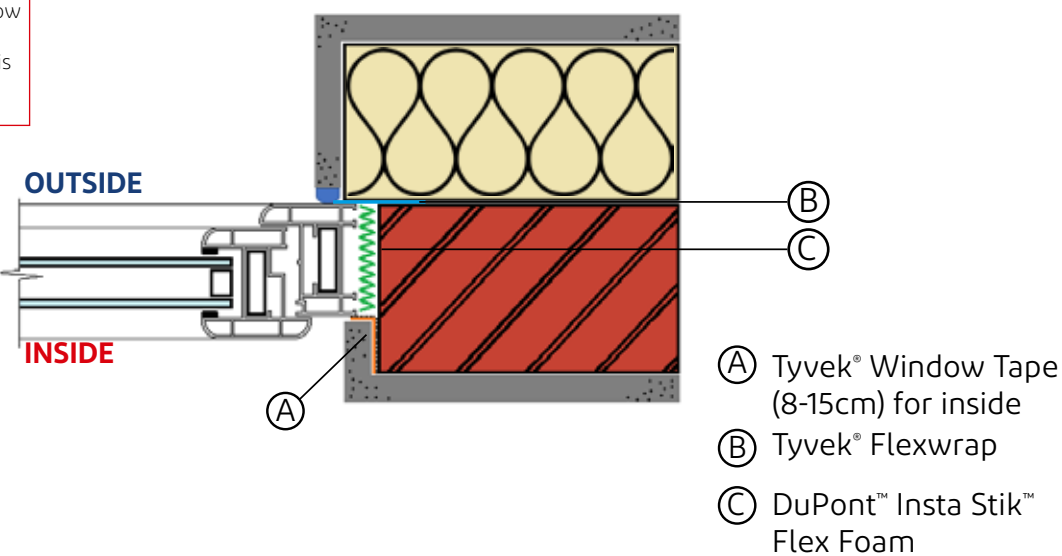


Fig. 10

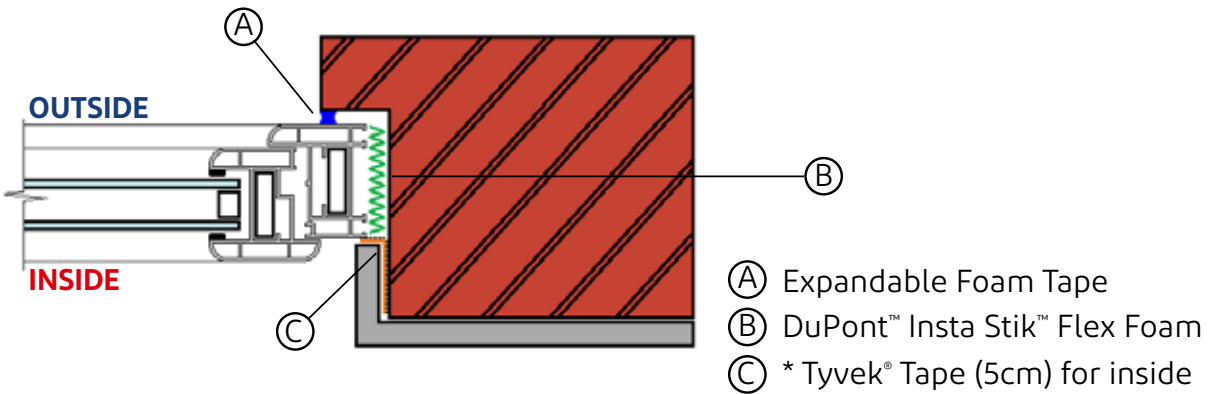
External sealing will be necessary as the window unit will be installed before the insulation is fitted.



Examples of window configurations across Europe

The renovation of existing dwellings

Fig. 11



* NOTE: Tyvek® Window Tape may be used in areas where render and/or dabs are being applied.

Fig. 12

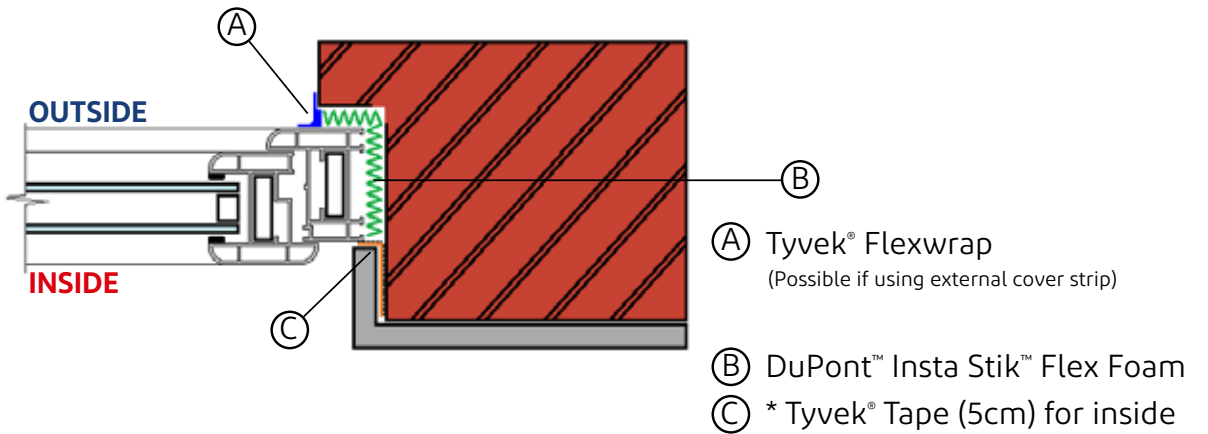
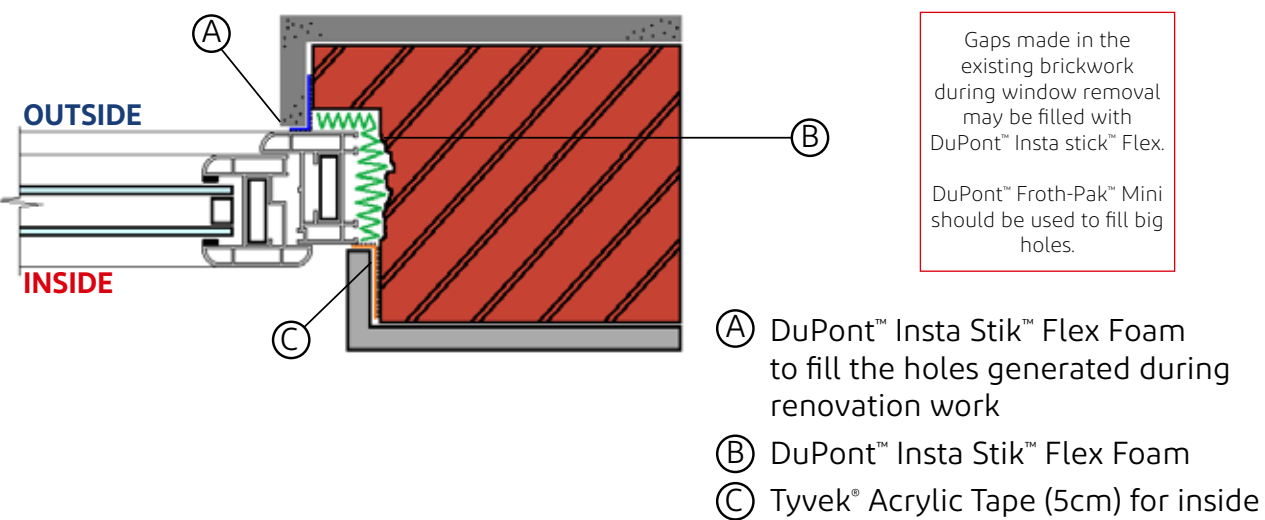


Fig. 13

Tyvek® Window Tape



Gaps made in the existing brickwork during window removal may be filled with DuPont™ Insta stick™ Flex. DuPont™ Froth-Pak™ Mini should be used to fill big holes.

Case Study

Melius Homes

Retrofit of modular panels manufactured off-site and installed on-site onto 1960s concrete buildings to increase the thermal performance and reduce uncontrolled air leakage by as much as 90%



www.meliushomes.co.uk



DUPONT
Tyvek



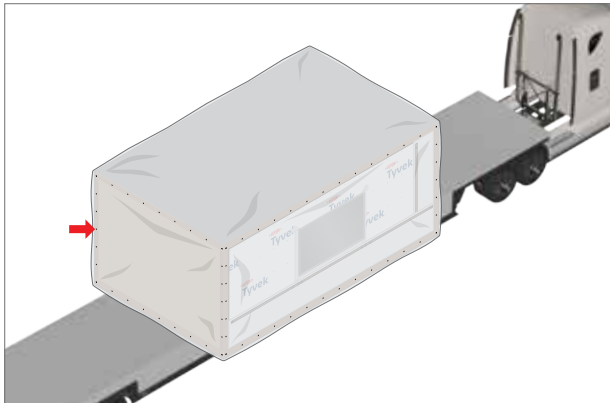
**Protection and packaging of modules
and panels during transportation.**

For all types of buildings

DuPont™ Tyvek® Weather Resistant Barrier (WRB)

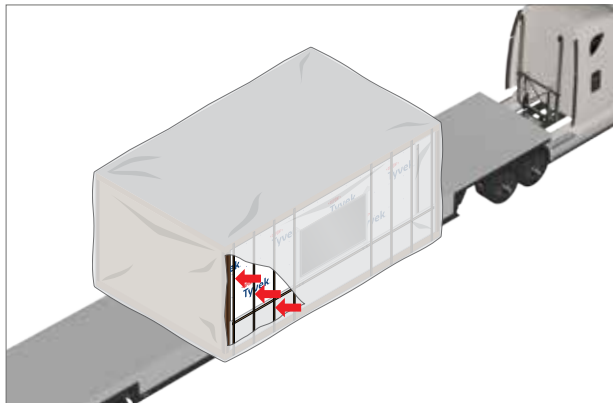
Special Considerations for Packaging Modules for Transport

DuPont recommends that modules be fully covered with a protective material such as a tarp or plastic sheeting to prevent damage to the module, wall components, and the **Tyvek® WRB**. When securing the protective covering to the modules, avoid fastener placement directly through the **DuPont™ Tyvek® WRB**. The following methods can be employed to secure the protective covering without damaging the **Tyvek® WRB**. Protection of the module will be determined by the manufacturer and is not limited to the methods shown below.



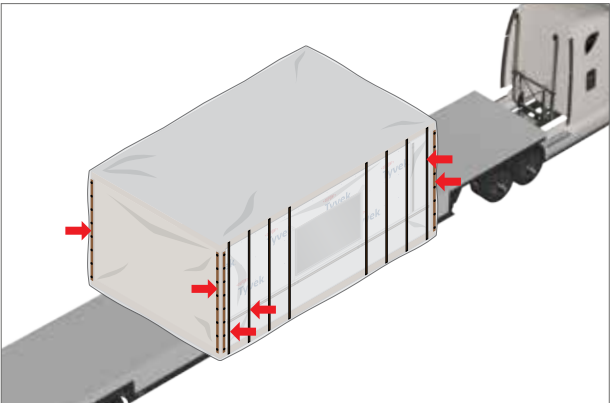
Method 1

Install the protective covering with fasteners at locations limited to framing, module bracing, or other structural members left exposed after folding and securing the **Tyvek® WRB** flaps.



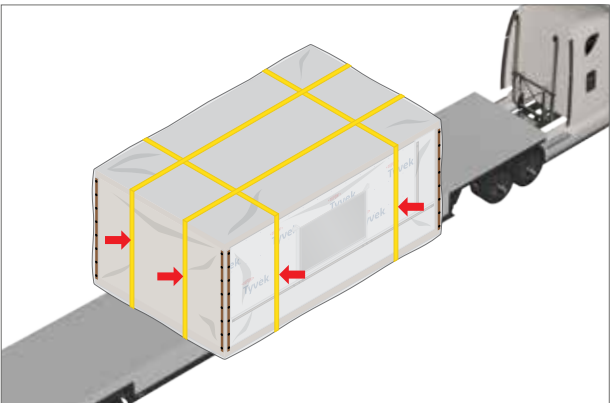
Method 2

Install vertical furring strips as needed across the face of the module **UNDER** the protective covering to provide a fastening base for attachment of the covering to during transport. The furring strips should be secured to framing, module bracing, or other structural members left exposed after folding and securing the **Tyvek® WRB** flaps.



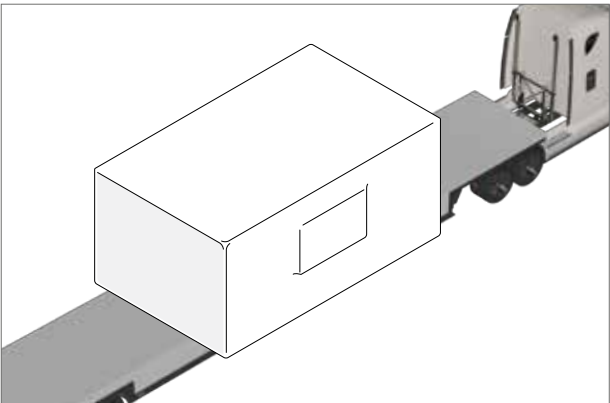
Method 3

Install vertical furring strips as needed across the face of the module **OVER** the protective covering to secure and reinforce during transport. The furring strips should be secured through the covering to framing, module bracing, or other structural members left exposed after folding and securing the **Tyvek® WRB** flaps.



Method 4

Install strapping as necessary around the protective covering to secure and reinforce during transport.



Case Study

Wolves Observation Lodge

Kgosi Lodge, owned by Wolf Watch UK, is located in magnificent Shropshire surrounded by over 100 acres of woodland. It overlooks 16 acres of red deer park in lush valley and forest, with an abundance of wildlife including deer, badgers and foxes. It accommodates a worldwide renowned sanctuary for displaced wolves. Kgosi Lodge operates as a short-stay holiday let and educational facility two-in-one. It enhances fundraising for charitable needs and facilitates academic research into wolves.

The lodge was built using light timber frame (Huws Gray Timber Engineering) with oak frame structure (Severn Oak Timber Frames Ltd). The project has utilised the weatherproofing benefits of DuPont™ Tyvek® Reflex, perfectly suited for timber frame, that keeps the structure safe and provides comfort for the occupants. The site being located in a secluded area posed logistic challenges that were overcome by using light timber frame panels manufactured off-site and erected by using solely human labour making it extremely environmentally friendly with minimal environmental footprint. Architecturally it employs overhanging eaves minimising visual impact on the peaceful and tranquil setting of the sanctuary.

Timber frame by: Huws Gray Timber Engineering (former A.C.Roof Trusses)
Oak frame and installation by: Severn Oak Timber Frames Ltd
Ownership: Wolf Watch UK



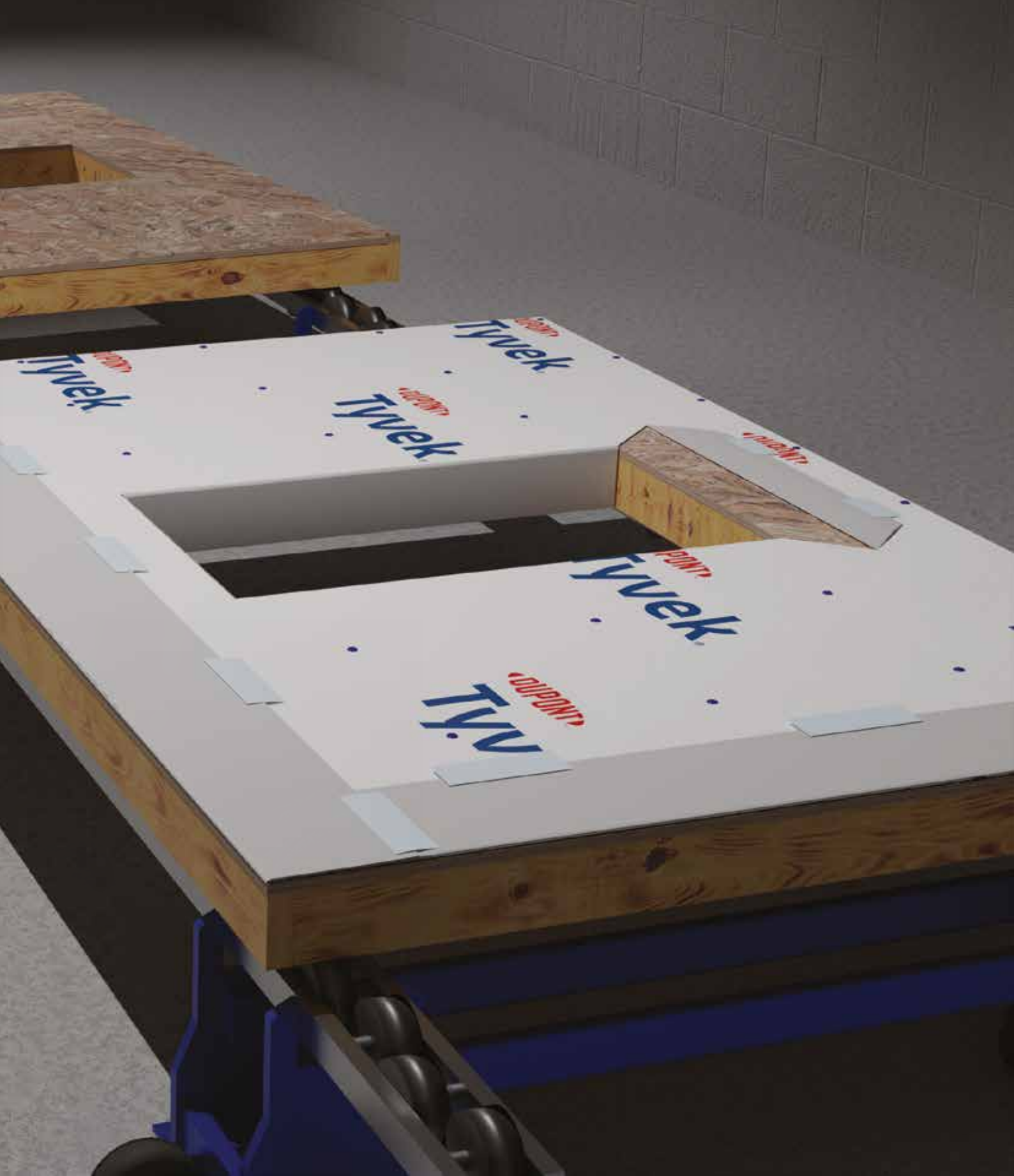
Structural Timber Awards - Wolf Lodge



DuPont Performance Building Solutions



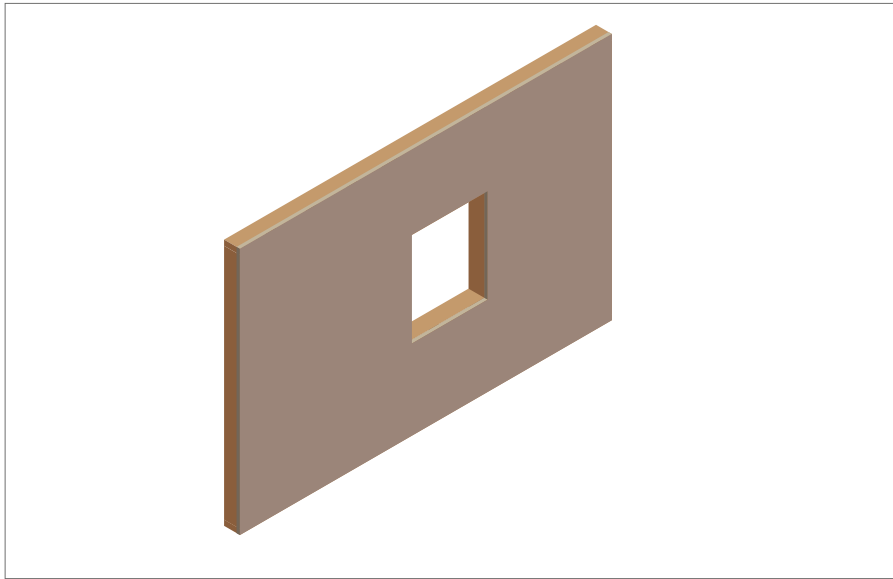
Installation of DuPont™ Tyvek® WRB for Wall Panel Construction



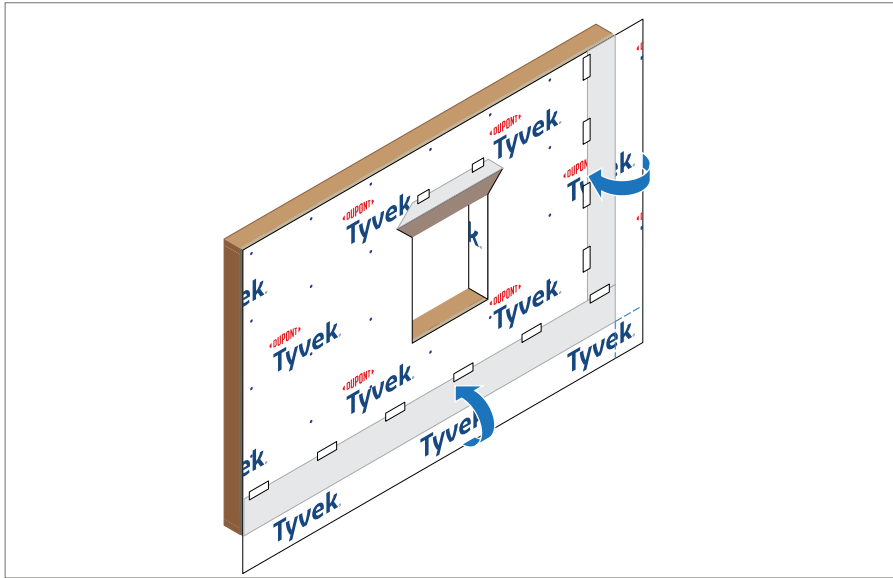
Introduction

Wall panels built off site may include the exterior wall envelope. Ensuring continuity of the wall envelope can be challenging when panels are integrated with each other during construction at the job site. The wall envelope is also susceptible to damage during transport and at the job site, jeopardizing intended air and water barrier properties. This installation guideline provides instructions for installing **DuPont™ Tyvek® Weather Resistant Barriers (WRB)** with flaps that can be easily folded and secured onto the face of the panels for transport. The flaps can then be unfolded and sealed as necessary during the construction process for wall envelope continuity. The process for installing the **DuPont™ Tyvek® Weather Resistant Barriers (WRB)** at the manufacturing site and subsequent integration with adjacent panels is summarized below.

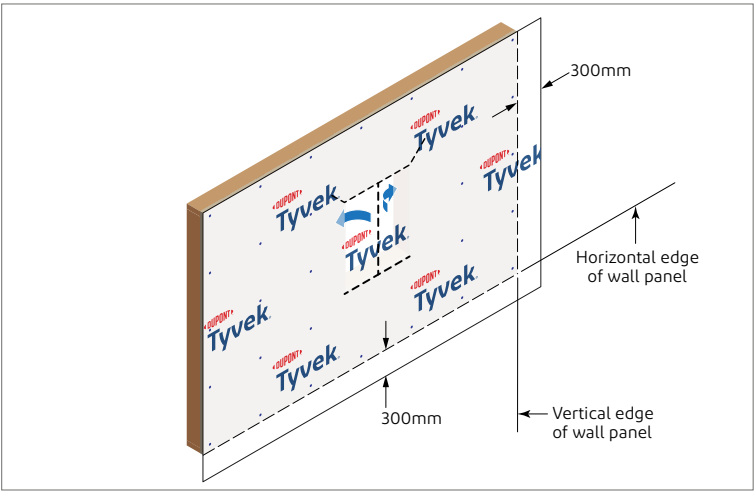
1. Panel with window rough opening



2. Panel with **DuPont™ Tyvek® Weather Resistant Barriers (WRB)** installed and prepared for window installation

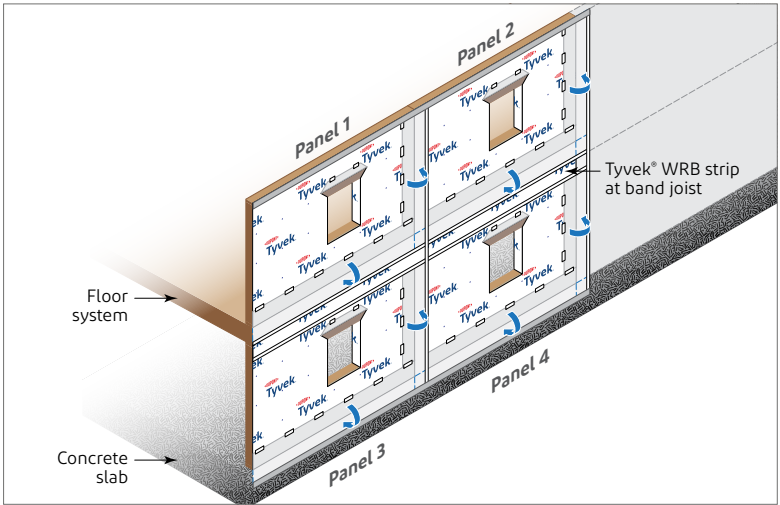


3. Panel with **DuPont™ Tyvek® Weather Resistant Barriers (WRB)**



Note: Window rough opening prepared for integral flanged window

4. Multiple panels at job site with **DuPont™ Tyvek® Weather Resistant Barriers (WRB)** flaps unfolded and sealed



Note: If building requires additional floors, panels from higher floors will be integrated to floors below in a similar manner.

Repairing Holes and Tears

- During the course of installing the **DuPont™ Tyvek® Weather Resistant Barriers (WRB)**, minor tears may occur. Be sure to tape all tears. Tears can easily be covered with **DuPont™ Tyvek® Tape** or **DuPont™ Self-Adhered Flashing products**.
- Larger tears may require cutting a piece of **DuPont™ Tyvek® Weather Resistant Barriers (WRB)** to repair the tear. Measure and cut a piece of **DuPont™ Tyvek® Weather Resistant Barriers (WRB)** large enough to cover tear with a minimum 150mm coverage around the tear and tape laps to ensure a watertight seal. Tape along the perimeter by starting at bottom of tear and shingling the upper tape over the bottom tape.

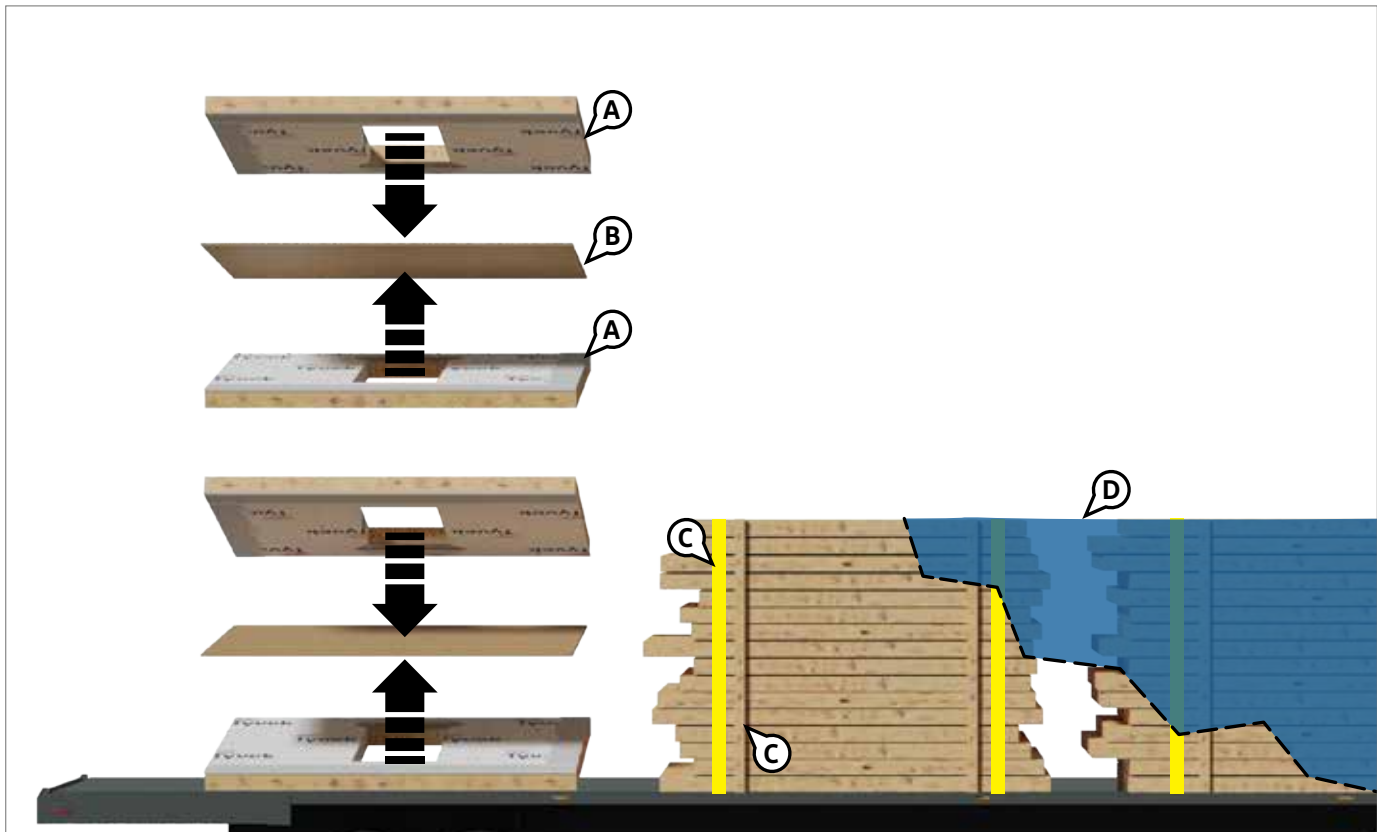
Special Considerations for Packaging Panels/Modules for Transport

Once the **DuPont™ Tyvek® Weather Resistant Barriers (WRB)** is installed to wall panels with flaps secured, DuPont recommends that panels are protected during transport to prevent damage to the panels and the **Tyvek® WRB**.

The following methods can be employed to protect the **DuPont™ Tyvek® Weather Resistant Barriers (WRB)** during transport. Protection of the panels will be determined by the manufacturer and is not limited to the methods shown.

- A. Panels can be stacked with the **DuPont™ Tyvek® Weather Resistant Barriers (WRB)** layer facing the **DuPont™ Tyvek® Weather Resistant Barriers (WRB)** layer of the next panel so that the WRB is protected during transport.
- B. Additional separating material such as cardboard can be inserted between panels for additional protection.
- C. Stacks can be bundled using straps and/or additional framing members secured vertically to the stack. Panels can also be secured to flat bed with straps.
- D. Stacks of panels can be loaded on flat bed trailers and covered with a tarp, plastic sheeting, or heat activated shrink wrap to protect the panels during transport for extra protection as necessary. If securing the protective material to panels with mechanical fasteners, fasten to the framing of the panels to ensure the **DuPont™ Tyvek® Weather Resistant Barriers (WRB)** is not damaged.

Notes: Regardless of which method is used, be careful when removing the protective covering and lifting panels off the stack to avoid damaging the **DuPont™ Tyvek® Weather Resistant Barriers (WRB)**. Repair as necessary per the Repairing Holes and Tears Section below.



Case Study

Premier Modular Ltd

Medium rise multi-occupancy housing protected by Class W1 and fire rated Tyvek® FireCurb® breather membrane



Premier Modular Construction
www.premiermodular.co.uk
Residential project, High Wycombe, UK

Product Portfolio

- DuPont™ AirGuard® air and vapour control layers
- DuPont™ Tyvek® breather membranes
- DuPont™ Tyvek® and DuPont™ AirGuard® adhesive accessories
- DuPont™ Insta Stik™ Polyurethane Foam Adhesive
- DuPont™ Froth-Pak™ Mini Polyurethane Foam Sealant
- DuPont™ Great Stuff™ Polyurethane Foam Sealant

AirGuard® A2 FR fire retardant AVCL

Airtight Vapour Control Layer for use within the internal lining of roof, ceiling and wall systems.

An airtight vapour control layer (AVCL) with Class A2 fire performance and very high vapour resistance. This internal membrane has a low emissivity reflective surface, which boosts thermal performance when used with a services void/batten space. Satisfies the fire regulations for use in external walls but may also be used as an AVCL in pitched and flat roofs. Suitable for buildings of any humidity classification, residential or commercial and from single-storey to hi-rise.

- Class A2, Fire Retardant
- System Classification: DuPont™ AirGuard® A2 FR CVCL with DuPont™ AirGuard® FR System tape (1310FR)
- Thermal benefit: low emissivity/reflective surface
- Tested and classified for free-span, on mineral wool slab, gypsum plasterboard or fibre cement board
- Suitable for all building types, heights and proximities
- A fire retardant AVCL with European Fire Classification A2.
- A full system test with AirGuard® FR System tape has been successfully tested according EN 13501-1

* The 25 Year Warranty only applies to the AirGuard® A2 FR product's performance. Warranty document available on request.



Properties	
Style name	5816X
Composition	Laminate of glass fibre-mesh with lacquered Aluminium foil.
Product designation acc. to EN 13984	Type B
Roll size	1.2m x 50m
Roll weight	10.4kg
Mass per unit area	165 g/m²
Reaction to fire	A2-s1,d0 (membrane)
Emissivity**	0.05
Water vapour transmission (Sd)	4,900m
CE marking	Yes



DuPont™ AirGuard® Control

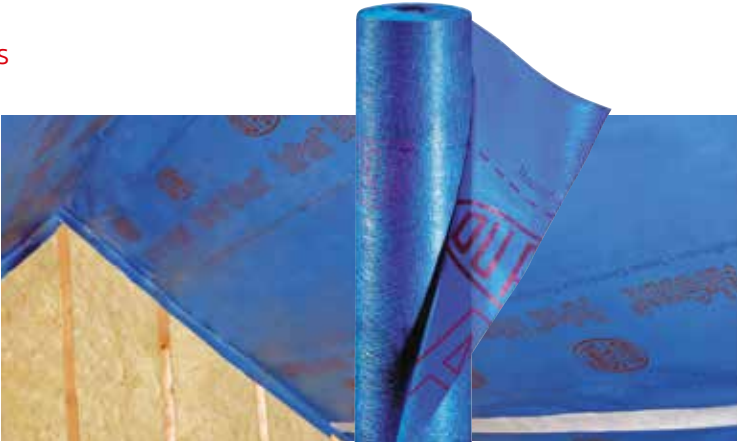
Strong AVCL for optimal airtightness in roofs, walls and floors

A dedicated air barrier with 100% airtightness and low vapour resistance, which allows rapid drying-out of damp wall elements. Primary function is to improve energy-efficiency by reducing convective heat losses through a roof, wall or floor element.

BBA certificates: 90/2548 – Product Sheet 4, 08/4548 - Product Sheet 3

- Limited vapour transmission
- Airtight and water resistant
- CE-conformity for plastic and rubber vapour control layer (EN 13984)
- Superior mechanical strength
- Reaction to Fire: Class E
- Lightweight - easy to install
- Reduces convective heat losses
- Reduces convective vapour transfer
- Reduces risk of trapped moisture in the insulation

Properties	
Style name	8327AD
Composition	DuPont™ Typar® spunbond & Ethylen-Butylacrylate Copolymer
Product designation acc. to EN 13984	Type A
Roll size	1.5 x 50m / 2.8 x 50m
Roll weight	8.5kg / 19kg
Mass per unit area	108 g/m²
Reaction to fire	Class E
Water vapour transmission (Sd)	5 m
CE marking	Yes
BBA certificate	N° 08/4548 and N° 90/2548



DuPont™ AirGuard® Reflective

AVCL which boosts your thermal insulation

A 100% airtight vapour control layer (AVCL) with very high vapour resistance and low emissivity reflective surface. Significantly boosts thermal performance when used with a services void/batten space. Suitable for use in SFS, timber, CLT and masonry wall systems, pitched and flat roofs. Chlorine resistant.

BBA certificates: 90/2548 – Product Sheet 5, 08/4548 - Product Sheet 4

- Highly vapour resistant
- Airtight and water resistant
- CE-conformity for plastic and rubber vapour control layer (EN 13984)
- Reflects ca. 95% of radiant heat
- Reduces heat loss by increasing R-value of the airspace to 0.67m²k/w
- Superior mechanical strength
- Reaction to Fire: Class E
- Considerably reduces risk of condensation into the insulation
- Reduces convective heat losses

Properties	
Style name	5814X
Composition	Composite of Polypropylene, Polyethylene and an aluminium foil
Product designation acc. to EN 13984	Type A
Roll size	1.5 m x 50 m
Roll weight	12kg
Mass per unit area	149 g/m²
Reaction to fire	Class E
Emissivity**	0.05
Water vapour transmission (Sd)	2000 m
CE marking	Yes
BBA certificate	N° 08/4548 and N° 90/2548

** A low emissivity value = high reflectivity = superior thermal performance.



DuPont™ AirGuard® Reflective E

AVCL which boosts your thermal efficiency

A 100% airtight vapour control layer (AVCL) with very high vapour resistance and low emissivity reflective surface. Significantly boosts thermal performance when used with a services void/batten space. Suitable for use in SFS, timber, CLT and masonry wall systems, pitched and flat roofs. Chlorine resistant.

BBA certificates: 90/2548 – Product Sheet 5, 08/4548 - Product Sheet 4

- Highly vapour resistant
- Airtight and water resistant
- CE-conformity for plastic and rubber vapour control layer (EN 13984)
- Reflects ca. 95% of radiant heat
- Reduces heat loss by increasing R-value of the airspace to 0.75m²k/w
- Good mechanical strength
- Reaction to Fire: Class E
- Considerably reduces risk of condensation



Properties	
Style name	8314X
Composition	DuPont™ Typar®, PE and Aluminum composite
Roll size	1.5 m x 50 m
Roll weight	9 kg
Mass per unit area	122 g/m²
Reaction to fire	Class E
Emissivity**	0.05
CE marking	Yes
Water vapour transmission (Sd)	2400 m

** low emissivity value = high reflectivity = superior thermal performance when combined with an air gap.

DuPont™ Tyvek® AirGuard® Smart

AVCL with variable vapour resistance

A 100% airtight vapour control layer with extreme variable vapour resistance which adapts to changes in humidity.

Provides efficient drying-out capacity for structures with built-in moisture. Suitable for roof, wall and floor elements in projects of low to medium moisture classification.

- Prevents structure damage and loss of insulation efficiency by smartly adapting to various moisture conditions and regulating the humidity in building elements
- Reduced drying out time
- Durability, health and longevity of buildings
- Greater energy efficiency
- Additional drying capacity for unplanned humidity infiltration
- Enhanced interior comfort



Properties	
Style name	2009B
Composition	Tyvek® with polymeric coating
Product designation acc. to EN 13984	Type B
Roll size	1.5 m x 50 m
Roll weight	12kg
Mass per unit area	92 g/m²
Reaction to fire	Class E*
Watertightness acc. to EN13859-1 based on 1928 (A)	W1
Water vapour transmission (Sd)	35 m (dry environment) 0.2 m (humid environment)
CE marking	Yes

* Installed on mineral wool.

DuPont™ Tyvek® Supro / Tyvek® Supro Plus

The market-leading breather membrane

Tyvek® Supro
Multi-purpose, reinforced, vapour permeable membrane, for use in wall systems where extra weather protection and strength is required. May be installed in direct contact with boards or insulation, but also free-hanging where there is no continuous supporting substrate. Also suitable for use as an insulation support in timber suspended floors and as a Type LR pitched roof underlay. Class W1 water resistance.

Tyvek® Supro Plus; as Tyvek® Supro but with integral adhesive lap tape to improve wind-resistance and/or improve building airtightness.

BBA certificate: 08/4548 – Product Sheets 1, 2 & 8

- Available with integrated tape (Supro Plus)
- Excellent water resistance
- Airtight / Windtight - unrestricted compliance with BS5534
- Vapour-permeable
- Provides superior air and moisture management for commercial and residential buildings
- For all supported and unsupported pitched roof applications - warm, hybrid and cold roofs
- Suitable for Scottish sarking board systems
- Suitable for wall and floor applications
- Long term performance



Properties	
Style name	2507B
Composition	Composite of High Density Polyethylene, Polypropylene
Roll size	1.0 m x 50 m / 1.5 m x 50 m / 3.0m x 50m
Roll weight	7.5kg / 12kg / 22kg
Mass per unit area	145 g/m²
UV exposure	4 months
Product- / Functional layer thickness	450 / 175 µm
Water vapour transmission (Sd)	0.025 m
CE marking	Yes
BBA certificate	N° 08/4548
NSAI certificate	N° 04/0157
Compliant with BS5534	In all 5 UK wind zones

DuPont™ Tyvek® Metal

A vapour-permeable drainage membrane

Vapour permeable drainage membrane based on Tyvek Supro, for use directly beneath rigid sheet standing-seam metal roof systems. Allows condensate which can form beneath stainless steel, aluminium, copper and coated zinc roofs to drain away.

Membrane has integral lap tape and must be installed over supporting boarding e.g. softwood, SiPs, ply or OSB. Please refer to details in technical roof manual.

- With integrated tape
- Excellent water resistance
- Airtight / Windtight
- Vapour-permeable
- Allows condensation beneath stainless steel, aluminium, copper and zinc roofs to drain away
- Should be installed over 150 mm wide timber boarding with 2 mm gaps between
- For use as drainage membrane beneath standing seam metal sheets roofs over timber boarding or SiPs.
- Long term performance



Properties	
Style name	2510B
Composition	Composite of High Density Polyethylene, Polypropylene non-woven and open mesh spacer
Roll size	1.5 m x 25 m
Roll weight	14.6kg
Mass per unit area	407 g/m²
UV exposure	4 months
Product- / Functional layer thickness	7.40 / 0.22 mm
Water vapour transmission (Sd)	0.03 m
CE marking	Yes

DuPont™ Tyvek® Housewrap

The ideal vapour-permeable timber frame wall membrane

Water resistant (W1) and lightweight vapour permeable wall membrane, suitable for use as the secondary protection layer in SFS, timber, CLT and masonry wall systems. Membrane should be fixed directly over supporting sheathing board, insulation or blockwork.

BBA certificate: No 90/2548 - Product Sheet 1

- Highly permeable to water vapour (sd-value: 0.01 m)
- Airtight / windtight and highly water resistant (>W1)
- Enhances the airtightness of the construction
- Lightweight, flexible and easy to install
- Should be surface applied, fixed directly to sheathing ply /OSB, insulation or blockwork
- Established & trusted long-term performance
- Also suitable for steel-frame and concrete structures



Properties	
Style name	3060B
Composition	High Density Polyethylene
Roll size	1.4 m x 100 m / 2.8 m x 100 m
Roll weight	9 kg / 18 kg
Mass per unit area	63 g/m²
UV exposure	4 months
Product- / Functional layer thickness	175 µm
Water vapour transmission (Sd)	0.01 m
CE marking	Yes
BBA certificate	N° 90/2548
NSAI certificate	N° 02/0144

DuPont™ Tyvek® StructureGuard™

The professional choice for commercial buildings

A very robust single layer vapour permeable Tyvek® wall membrane with enhanced water resistance (W1) and exceptional airtightness. Suitable for use in many wall systems and building types, but particularly suited to low-rise commercial buildings with steel frame, masonry and rainscreen systems.

BBA certificate: 90/2548 - Product Sheet 9

- Exceptional airtightness
- Windtight and highly water resistant (>W1)
- Lightweight, flexible and easy to install
- Provides superior air and moisture management for commercial and residential buildings
- Long-term performance
- Suitable for walls in timber frame, metal frame, masonry and internal insulation upgrade



Properties	
Style name	1560B
Composition	High Density Polyethylene
Roll size	750mm x 100m / 1.4 m x 100 m / 2.7 m x 100 m
Roll weight	4.5 kg / 8.7 kg / 17.4 kg
Mass per unit area	58 g/m²
UV exposure	4 months
Product / Functional layer thickness	175 µm
Water vapour transmission (Sd)	0.015 m
CE marking	Yes
BBA certificate	N° 08/4548

DuPont™ Tyvek® FireCurb® breather membrane

The new building breather membrane that limits the propagation of flames

A fire-retardant breather membrane with improved Class B fire performance to EN 13501-1. Suitable for use in all wall systems and building types, but with focus on high-rise buildings, or projects that demand products with higher fire class. Class W1 water resistance.

BBA certificate: 90/2548 - Product Sheet 8

- All the benefits of a standard breather membrane
- Self-extinguishing when ignited
- Limits propagation of flames
- Halogen-free flame retardant coating
- Includes all previous Tyvek® characteristics for energy efficient and condensation free building
- Long term investment protection
- Greater safety during and after installation

*(if installed freehanging, on mineral wool & cementitious boarding--> B-s1,d0 , if installed onto wood --> D-s2,d2)

Application: Tyvek® FireCurb™ is typically installed onto the external side of the insulation material or integrated in the wall structure system. It can be used as a solution for ventilated Façades.



Properties	
Style name	2066B
Composition	Flash-spun-bond HDPE with flame retardant coating
Roll size	1.5 m x 50 m
Roll weight	6kg
Mass per unit area	68g/m2 g/m²
UV exposure	4 months
Product- / Functional layer thickness	175 µm
Reaction to fire* (EN13501-1)	B-s1,d0
Temperature resistance	-40 to +100° C
Water vapour transmission (Sd)	0.035m
CE marking	Yes
BBA certificate	N° 90/2548

DuPont™ Tyvek® Reflex

The right reflective breather membrane

A reflective low emissivity vapour permeable wall membrane for thermal performance. Metallised surface reflects radiant heat in summer and reduces heat loss in winter. Suitable for use in SFS, timber, CLT and masonry wall systems, as well as internal insulation upgrades. Class W1 water resistance.

BBA certificate: 90/2548 - Product Sheet 3

- Windtight and water resistant but vapour-open
- Low emissivity surface (0,10) results in highly reflective product (90 %) for improved thermal comfort
- Reduces heat loss and improves U-value of wall element
- Improves indoor summer comfort by limiting solar heat gain
- Enhances the airtightness of the construction
- Lightweight, flexible and easy to install
- Long-term performance



Properties	
Style name	3583M
Composition	High Density Polyethylene with metallised surface
Roll size	0.48 m x 100 m / 1.50 m x 100 m / 2.70 m x 100 m / 3 m x 100 m
Roll weight	4.2kg / 13kg / 25 kg / 29kg
Mass per unit area	83 g/m²
UV exposure	4 months
Product / Functional layer thickness	220 µm
Emissivity	0.10
Temperature resistance	-40 to +100° C
Water vapour transmission (Sd)	0.03 m
CE marking	Yes
BBA certificate	N° 90/2548

DuPont™ Tyvek® UV Façade / Tyvek® UV Façade Plus

Protection for open and ventilated rainscreen cladding

Tyvek® UV Façade: black, unbranded, UV resistant vapour permeable wall membrane for use behind open jointed cladding in SFS, timber, CLT and masonry wall systems. Water resistant (W1) and very durable with high tensile and tear strength assuring durable long-term performance.
Tyvek® UV Façade Plus; as Tyvek UV Façade, but with integral adhesive lap tape to improve airtightness and/or resistance to inclement weather.
BBA certificate: 90/2548 - Product Sheet 7

- Black, unbranded membrane
- Tested for 5000 hours UV ageing to EN 13859-2, followed by 90 day heat exposure at 70 °C. The membrane retained its full performance
- Windtight, water resistant and vapour-permeable
- For joint width of up to 3 cm
- Greatly enhances the airtightness of the construction
- Very robust, but flexible & easy to install
- Long-term performance
- Suitable for open or ventilated cladding in timber, metal, stone and other materials
- Reaction to fire class E



Properties	
Style name	2524B
Composition	Composite of High Density Polyethylene, and Polypropylene
Roll size	1.5 m x 50 m / 3.0 m x 50 m
Roll weight	16kg / 31.5kg
Mass per unit area	195 g/m²
UV exposure	see details on technical datasheet
Product- / Functional layer thickness	600 /220 µm
Water vapour transmission (Sd)	0.035 m
CE marking	Yes
BBA certificate	N° 90/2548

Essential DuPont™ Tyvek® and DuPont™ AirGuard® Tapes and adhesive accessories

Create windtight, airtight and watertight seals with DuPont™ Tyvek® and DuPont™ AirGuard® tapes and accessories

The energy efficiency of domestic and non-domestic buildings is to a great extent dependant on the continuity of materials used in the building envelope. The range of accessories has been developed to complement and enhance building envelope solutions with Tyvek® and AirGuard® membranes.

- It helps to:
- reduce or avoid air leakage through the building envelope
 - reduce or avoid wind washing
 - reduce or avoid dust and pollen penetration
 - prevent animals (birds, insects...) from entering buildings.

Tyvek® Acrylic Tape (2060B)

Single-sided DuPont™ Tyvek® (HD-PE) with modified acrylic adhesive with or without a paper split-release liner.

- Suitable for sealing membrane laps, but particularly suitable for making good around penetrations and for damage repair for most Tyvek® underlays and AirGuard® vapour control layers
- With a split liner it is ideal to seal the AirGuard® vapour control layer to windows and doors

Dimensions	75mm x 25m
	60mm x 25m with split liner
Rolls per box	75mm: 8
	60mm: 10



Tyvek® Metallised Tape (2060M)

Single-sided reflective tape for sealing laps of Tyvek® Reflex, AirGuard® Reflective, AirGuard® Reflective E and AirGuard® A2 FR.

- Ideal for making good around penetrations, pipework, windows and doors
- Made of metallised Tyvek® and modified acrylic adhesive
- Provides a durable bond

Dimensions	75mm x 25m
Rolls per box	75mm: 8



DuPont™ AirGuard® FR System Tape (1310FR)

A high performance, reflective, single-sided Air & Vapour Control Layer Tape (ACVL), with European fire class A2 in combination with DuPont™ AirGuard® A2 FR AVCL. Dedicated for use with DuPont™ AirGuard® A2 FR AVCL for airtight sealing of laps, joints, functions, windows and doors and sealing around penetrations such as pipework, wiring and structural elements.

Dimensions	75mm x 25m
Rolls per box	20



DuPont™ AirGuard® Tape (1310V)

High performance airtight vapour control layer overlap tape, that is very flexible, hand-tearable with a very high tack that sticks on all smooth or rough surfaces such as PE films, spun-bond, wood or PVC.

Dimensions	60mm x 25m
Rolls per box	60mm: 10



Tyvek® FlexWrap EZ and NF (2064FW and FLEXNF)

- High performance flexible self-adhesive flashing tape.
- Significantly helps in facilitating the creation of airtight and water tight seals around windows, doors, chimney breasts, pipe penetrations and any custom shapes
- Designed to ensure continuity, compatibility and integrity with all Tyvek® breather membranes and AirGuard® air and vapour control layers.

Dimensions	60mm x 10m (EZ)
	152mm x 23m (NF)
	228mm x 23m (NF)
Rolls per box	60mm: 3
	152mm: 1
	228mm: 1



Tyvek® Window Tape/Plastering Tape (1310PT)

A high performance airtight and moisture adaptive carrier tape that can be plastered over. It seals difficult areas like windows, doors and timber to block connections – one product that fits application outside and inside.

Dimensions	80mm x 25m
	150mm x 25m
Rolls per box	80mm: 6
	150mm: 4



DuPont™ FlexWrap Tapes

Saving time and money to make a more durable seal



Tyvek® FlexWrap NF
Length: 23 m
Width: 15 cm
Width: 23 cm

(For NF products other widths are available)



Tyvek® FlexWrap EZ
Length: 10 m
Width: 60 mm

Flexible and expandable high performance tapes for air and water tight seals around roof, ceiling and wall penetrations

Applications:

- Building penetrations including roof and window junctions (VCL/frame interface), pipes, brackets, vents, cables and other openings to resist air, wind & water ingress
- For external application behind a building facade or roof covering and internal air and vapour sealing
- For floor to wall seals (using appropriate surface primer where required)
- Suitable for gap closures where a small amount of building material movement over time may affect the performance of other products

Benefits:

Superior protection /air and watertight seals

- Helps seal the building envelope
- Creates more airtight seals compared to standard tapes used on irregular shapes/ penetrations

Easy installation

- Packaged in ready-to-use rolls
- No requirement for additional fixings
- Approx. 50% quicker to fit compared to standard tapes and seals

Superior durability

- Extendable tape constructed with a durable Tyvek® top-sheet, a premium butyl adhesive layer, and a specially designed split release liner
- Allows for structural movements
- UV resistant

Excellent adhesion performance

- Ensures continuity, compatibility and integrity with all Tyvek® breather membranes, AirGuard® AVCLs and other membranes at penetrations
- 100% butyl adhesive performs over a wide temperature range
- Compatible with most common building materials



DuPont™ FlexWrap NF and EZ Tapes Flexible and Expandable

Installation around pipes



Installation around windows



Installation around beams and joists



Technical Data	FlexWrap NF	FlexWrap EZ
Coverage	3.4 m²	0.6 m²
Colour	white (black adhesive)	white (black adhesive)
Rolls per box	1	3
Temperature resistance	from - 30 °C rather + 80 °C (temporary 100 °C)	from - 30 °C rather + 80 °C (temporary 100 °C)
Elongation	ca. 160 % (2.6 x of the original length)	ca. 130 % (2.3 x of the original length)
Installation temperature	> 0 °C	> 0 °C
UV resistance	4 months	4 months

Installation guidelines

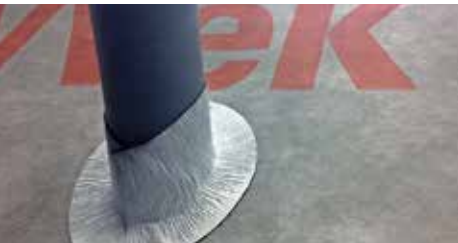
Surface preparation

The surface must be free from dirt, moisture, ice, grease and other materials which could reduce the adhesion. Tyvek® FlexWrap is to be installed when dry and at temperatures above 0 °C. A primer may be used for application temperatures below 0 °C and non-ideal surface conditions.

Installation

- Properly position Tyvek® FlexWrap around the surface to seal.
- Minimise wrinkles and bubbles by smoothing the surface and by repositioning as necessary.
- Apply pressure by hand along the entire surface to achieve a good bond to the substrate. (After pressure has been applied repositioning may be difficult.)
- After completion of the installation Tyvek® FlexWrap has to be covered within 4 months with the appropriate building materials.
- For step by step guidance on how to use Tyvek® FlexWrap please see our Installation Guide and videos in the downloads section of our web site www.energy-efficiency.dupont.com or use the QR code below

Installation around pipes (EZ)



Watch the installation video for more details goo.gl/dZGcq



ELONGATION (Stretch capability)

- Tyvek® FlexWrap NF - approx. 160% (2.6 times original length)
- Tyvek® FlexWrap EZ - approx. 130% (2.3 times original length)

Tyvek® Double-sided Tape (1310D)

Double-sided acrylic tape ideal for sealing overlaps and bonding Tyvek® membranes to smooth surfaces.

- Excellent adhesion properties under extreme humidity conditions
- Strong initial tack
- Recommended for Tyvek® UV Façade, but suitable for all Tyvek® membranes and AirGuard® air and vapour control layers (AVCL)

Dimensions	50mm x 25m
Rolls per box	50mm: 12



Tyvek® Double-sided Tape (1310D)

Double-sided acrylic tape ideal for temporary fixings of a vapour control layer and limited space detailing.

Dimensions	20mm x 25m
Rolls per box	20mm: 10



Tyvek® Butyl Tape (1311B)

Double-sided butyl based sealant, used to form a moisture and airtight seal between a Tyvek® membrane or an AirGuard® air and vapour control layer and most commonly used building materials.

- The product is compatible with brickwork, blockwork, masonry, timber, metalwork and most plastic products
- Tyvek® Butyl Tape is most effective when used under compression, e.g. under a timber batten and is recommended for use at perimeters, chimneys, abutments and for sealing nail penetrations and around electrical sockets

Dimensions	20mm x 30m
	50mm x 30m
Rolls per box	20mm: 8
	50mm: 4



Tyvek® UV Façade Tape (1312F)

- Single-sided acrylic tape with high UV resistance.
- Especially designed for sealing Tyvek® UV Façade overlaps, penetration and joints in a durable and non-contrasting manner.
- Excellent ageing and outdoor performance.

Dimensions	75mm x 25m
Rolls per box	75mm: 8



Tyvek® Primer (1310P)

Transparent primer that is permanently tacky after curing and with very fast curing time. It is recommended for very porous surfaces to create a good adhesion.

Capacity	1L
Bottles per box	6



DuPont™ AirGuard® Sealant (1211S)

An adhesive sealant for permanently elastic, airtight bonding of joints and structural connections as well as connections of vapour control layers to many surfaces. It provides excellent adhesion to most surfaces such as stone, concrete, plaster, plasterboard and wood.

Capacity	310ml
Cartridges per box	20



Spray Polyurethane Accessories- Sealants, Adhesives and Insulation*

DuPont™ Great Stuff™ All Direction Straw Foam

All direction Spray Polyurethane Foam

- **Composition:** One component, moisture curing, Polyurethane foam
- **Product size:** 150ml, 300ml, 500ml and 750ml cans
- **Dispenser:** Plastic Straw included
- Expanding foam, can be sprayed with the can in every position, works any way up
- Bonds to Masonry, Metal, Glass, wood and most plastics



DuPont™ Great Stuff™ Pro Fixer Window & Door

Minimal expansion Spray Polyurethane Sealant

- **Description:** Spray Polyurethane foam sealant for Windows and Doors
- **Composition:** One component, moisture curing, Polyurethane foam
- **Product size:** 750ml cans
- **Dispenser:** Spray Gun (not included)
- Bonds to Aluminium, PVC, Masonry, Metal, Glass, wood and most plastics



DuPont™ Great Stuff™ Pro Fire Rated Foam

Regular expansion Spray Polyurethane Sealant Fire Rated

- **Foam colour:** Pink foam for easy identification
- **Composition:** One component, moisture curing, Polyurethane foam
- **Product size:** 750ml cans
- **Dispenser:** Straw (Plastic Straw included) / Spray Gun (not included)
- Spray Polyurethane foam sealant Fire Rated / B1 Fire Rated according to DIN 4102
- 5 hours fire rating obtain with a concrete gap size of 15mm x 220mm according to the BS 476 Pt 20:1987
- Different gap size and material will impact the fire performance
- Bonds to Masonry, Metal, Glass, wood and most plastics, for other surfaces please contact DuPont
- Noise reduction according to EN ISO 717-1:2013 up to 58dB



DuPont™ Great Stuff™ Pro Gaps & Cracks

Spray Polyurethane expanding foam

- **Composition:** One component, moisture curing, Polyurethane foam
- **Product size:** 750ml cans
- **Dispenser:** Spray Gun (not included)
- Spray Polyurethane foam gap filler and cracks
- Bonds to Masonry, Metal, Glass, wood and most plastics, for other surfaces please contact DuPont



DuPont™ Insta Stik™ Multi-Purpose Fast Cure

Spray Polyurethane foam adhesive

- **Description:** Spray Polyurethane foam adhesive
- **Composition:** One component, moisture curing, Polyurethane foam
- **Product size:** 750ml cans
- **Dispenser:** Straw (Plastic Straw included) / Spray Gun (not included)
- Fast curing
- B2 Fire Rated according to DIN 4102, for thickness up to 10mm
- Adhesion to Plasterboard, Insulation boards (PU, PIR, MW, XPS, EPS), Timber, Blockwork, Bricks, Glass, Metal, Roof tiles, for other surfaces please contact DuPont
- Adheres up to 15m² with one can
- Can be used horizontally or vertically



DuPont™ Insta Stik™ Flex +

Spray Polyurethane Flexible foam adhesive

- **Description:** Spray Polyurethane Flexible foam adhesive
- **Composition:** One component, moisture curing, Polyurethane foam
- **Product size:** 750ml cans
- **Dispenser:** Straw (Plastic Straw included) / Spray Gun (not included)
- Fast curing
- Noise reduction according to EN ISO 717-1:2013 up to 60dB
- Airtightness according to EN 12114 of 600Pa
- B2 Fire Rated according to DIN 4102, for thickness up to 20mm
- Adheres to Aluminium, PVC, timber, Blockwork, Bricks, Glass, Metal, Roof tiles



DuPont™ Froth-Pak™


Spray Polyurethane Insulation

- **Description:** Spray Polyurethane foam insulation
- **Composition:** Two component Polyurethane foam (Component A MID, Component B Polyol)
- **Product Variant:** QR (quick rise), SR (slow rise), HD (high density)
- **Product size:** 2 x 5,5 kg (FP180), 2 x 23 kg (FP600)
- **Dispenser:** INSTA-FLO™ Gun (not included in FP600, include in the FP180)
- Supplied in the UK by DuPont BKC, Bristol, UK
- Adheres to timber, Blockwork, Bricks, Glass, Metal, Roof tiles, PVC, Aluminium and most plastics










* For where to buy (UK and Ireland) information on any of the above SPU products please contact the DuPont™ Tyvek® Building Knowledge Centre, Bristol, UK

Product Data

Composition	
Product thickness (mm)	
Functional layer thickness (mm)	
Weight (g/m²)	
Roll width (m)	
Roll length (m)	
Roll weight (kg)	
Rolls per pallet	
Performance characteristics	British/European Standard
Water vapour resistance (MN.s/g)	EN ISO 12572
Sd (m)*	EN ISO 12572
Water Resistance	EN 1928 (A)
Water Head (m)	BS EN ISO 811
Air Permeability (m³/m²/hr at 50Pa)	EN 12114
Air resistance / permeance	ISO 5636/5 (Gurley)
Tensile strength (N/5cm)	EN 12311-1 (MD/XD)
Elongation (%)	EN 12311-1 (MD/XD)
Nail tear resistance (N)	EN 12310-1 (MD/XD)
Fire classification	EN 13501-1
Thermal resistance (Airspace) (m²K/W)	BS EN ISO 6946
CE Certification 	EN 13859-1 EN 13859-2 EN 13984

Vapour Permeable Membranes (External)

Roof	
Tyvek® Supro/Supro Plus <small>BBA Certificate 08/4548</small>	Tyvek® Metal <small>BBA Certificate 08/4548</small>
	
HDPE and PP	HDPE and PP with PP mesh
0.49	7.4
0.175	0220
145	407
1.0 / 1.5 / 3.0	1.5
50	25
7.5 / 12 / 22	14.6
24 / 30	4
Tyvek® Supro/Supro Plus (2507B)	Tyvek® Metal (2510B)
0.1	0.156
0.02	0.03
W1	W1
2.0	>2.0
<0.23	<0.1
-	-
290/235	340/280
13 / 21	12/18.5
180/205	165/175
E**	E**
-	-
Yes Yes -	Yes Yes -

Wall				
Tyvek® Housewrap <small>BBA Certificate No 90/2548</small>	Tyvek® Reflex <small>BA CertificateB0/2548</small>	Tyvek® StructureGuard™ <small>BBA Certificate No 90/2548</small>	Tyvek® UV Facade/ Facade Plus <small>BRE Certificate No 155/10</small>	Tyvek® FireCurb® Breather Membrane <small>BBA Certificate 90/2548</small>
				
HDPE	Metalised HDPE	HDPE	HDPE and black PP	HDPE with char layer
0.175	0.220	0.175	0.60	0.175
0.175	0.220	0.175	0.22	0.175
63	83	58	195	68
1.4 / 2.8	0.48 / 1.5 / 2.7 / 3.0	0.75 / 1.4 / 2.7	1.5 / 3.0	1.5
100	100	100	50	50
9 / 18	4.2 / 13 / 25 / 29	4.5 / 8.7 / 17.4	16 / 31.5	6
20 / 35	80 / 24 / 20 / 20	35 / 24 / 24	24	24
Tyvek® Housewrap (3060B)	Tyvek® Reflex (3583M)	Tyvek® StructureGuard™ (1560B)	Tyvek® UV Facade (2524B)	Tyvek® FireCurb® Breather Membrane (2066B)
0.5	0.15	0.075	0.175	0.075
0.01	0.03	0.015	0.035	0.015
W1	W1	W1	W1	W1
1.5	2.0	2.0	3.0	1.4
<2	< 0.05	≤0.25	<0.1	<2
-	-	-	-	-
310/310	250/210	165/135	390/320	275 / 275
17/20	10/13	9/14.5	13/19	15/18
55/50	90/85	60/60	310/370	41 / 36
E**		E**	E** & D-s1,d0****	B-s1,d0*** & D-s2,d0****
-	0.57	-	-	-
- Yes -	Yes Yes -	Yes Yes -	Yes Yes -	- Yes -

AVCL's (Internal)


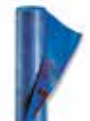










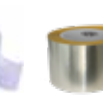





Roof • Wall • Floor			
DuPont™ AirGuard® Reflective <small>BBA Certificate: 90/2548 and 08/4548</small>	DuPont™ AirGuard® Control <small>BBA Certificates 90/2548 and 08/4548</small>	DuPont™ Tyvek® AirGuard® Smart <small>BBA Certificate July 2021</small>	DuPont™ AirGuard® A2 FR
			
HDPE, PP and aluminium	PP with copolymer	HDPE with polymeric coating	Glass fibre and aluminium
0.43	0.32	0.2	0.15
-	-	-	-
149	108	92	165
1.5	1.5 / 2.8	1.5	1.2
50	50	50	50
12.0	8.5 / 19	12	10.4
25	24	24	25
DuPont™ AirGuard® Reflective (5814X)	DuPont™ AirGuard® Control (8327AD)	DuPont™ Tyvek® AirGuard® Smart (2009B)	DuPont™ AirGuard® A2 FR (5816X)
10,000	25	1 to 182	24,000
2,000 (>500)	5	0.2 to 35	4,900
pass	pass	W1	pass
-	-	3.0	-
-	-	-	-
>2,000s	>2,000s	>2,000s	>2,000s
440/210	200 / 175	390 / 380	800/800
25 / 21	40 / 40	16 / 19	4/4
210 / 210	210 / 220	75 / 65	170/150
E	E	E	A2-s1,d0***
Roof: 0.45, Wall: 0.67	-	-	Roof: 0.45, Wall: 0.66
- - Yes	- - Yes	- - Yes	- - Yes

Table last updated 12th October 2021 please check for any more recent updates

* tested acc.to EN ISO 12572 climate C (multilayer method). ** installed on mineral wool. *** Installed free-span and on materials with at least A2-s1, d0 classification to EN 13501-1. ****installed on timber.

Product Data

Acrylic Tapes										Butyl Tapes			Accessories	
	Tyvek® Acrylic Tape	Tyvek® Acrylic Tape with split-release liner	Tyvek® Metallised Tape	Tyvek® UV Facade Tape	Tyvek® Double Sided Tape	Tyvek® Double Sided Tape (detailing)	Tyvek® Window Tape	DuPont™ AirGuard® Tape	DuPont™ AirGuard® FR System Tape	Tyvek® Butyl Tape	FlexWrap NF	FlexWrap EZ	Tyvek® Primer	DuPont™ AirGuard® Sealant
Product Style Code	2060B	2060B	2060M	1312F	1310D	1310D	1310PT	1310V	1310FR	1311B	FLEXNF	2064FW		1211S
														
Product Type	Single-Sided	Single-Sided	Single-Sided	Single-Sided	Double-Sided	Double-Sided	Single-Sided	Single-Sided	Single-Sided	Double-Sided	Single-Sided	Single-Sided	Bottle	Cartridge
Composition	Spunbonded polyethylene /single sided acrylic adhesive	Spunbonded polyethylene /single sided acrylic adhesive	Spunbonded polyethylene / single sided acrylic adhesive / metallised paper release liner	Single-sided acrylic tape / high UV-stabilised Polypropylene	PES/PVA-grid / acrylic adhesive / paper liner	PES/PVA-grid / acrylic adhesive / paper liner	PET/PA film/acrylic adhesive / PP liner	PE film / acrylic adhesive / PP liner	Glassfibre & Aluminium / acrylic adhesive / paper liner	100% butyl mastic / siliconised paper liner	A crimped DuPont™ Tyvek® top sheet / butyl mass	A crimped DuPont™ Tyvek® top sheet / butyl mass		
Thickness (mm)	0.3	0.3	0.3	0.7	0.15	0.15	0.3	0.3	0.15	1.2	1.6	1.6	1 litre	310ml
Weight (g/m²)	320	220	320	410	220	220	300	375	215	1560	1200	1200		
Roll width (mm)	75	60	75	75	50	20	80 150	60	75	50 20	152 228	60		
Roll length (m)	25	25	25	25	25	25	25	25	25	30	23	10		
Roll weight (kg)	0.62	0.45	0.62	0.7	0.3	0.15	0.6 1.13	0.6	0.57	2.5 1.0	4.4 7.5	1.1		
Rolls/Tubes/Bottles per pallet/box	8	10	8	8	12	10	6 4	10	20	4 8	1	3	6	20
Internal use	X	X	X		X	X	X	X		X	X	X	X	X
	X	X	X	X	X		X			X	X	X	X	
	X	X	X	X	X		X			X	X	X	X	
Overlaps and overall repair	DuPont™ Tyvek® underlays for roof (EN13859-1)	●	●	●	●		●			●	●	●		
	DuPont™ Tyvek® underlays for walls (EN13859-2)	●	●	●	●	●		●		●	●	●		
	DuPont™ Tyvek® UV Facade (EN13859-2 with open joints)				●	●		●		●	●	●		
	DuPont™ AirGuard® AVCL all applications (EN13984)	●	●	●	●	●	●	●	●	●	●	●		●
	Masonry / concrete / render (smooth)	●	●	●	●	●	●	●	●	●	●	●	●	●
	Brick / block / concrete / render (rough)	●	●	●	●	●	●	●	●	●	●	●	●	●
	Plasterboard	●	●	●	●		●	●	●	●	●	●	●	●
	Eaves Carrier					●				●				
	Window / door frames (PVC, Wood, Aluminium)	●	●	●	●	●	●	●	●	●	●	●	●	●
	OSB & Wood fibre	●	●	●	●	●	●	●	●	●	●	●	●	●
Material compatibility and recommended use	Timber (rough, sawn)	●	●	●	●	●	●	●	●	●	●	●	●	●
	Timber (planed)	●	●	●	●	●	●	●	●	●	●	●	●	●
	Metal (aluminium, steel, copper, ...)	●	●	●	●	●	●	●	●	●	●	●		●
	Construction membranes (PE, PVC, PP, PES, Alu, ...)	●	●	●	●	●	●	●	●	●	●	●		●
	Pipe penetrations (plastic & metal)	●	●		●				●	●	●	●		
	Wiring / cable penetrations	●	●		●				●	●	●	●		●
	Around electrical sockets	●	●		●				●	●	●	●		●
	Windows & Doors to timber frame (inside)	●	●						●	●	●	●		●
	Windows & Doors to timber frame (outside)	●	●		●				●	●	●	●		
	Windows & Doors to bricks & blocks (inside) *	●	●						●	●	●	●		●
Penetrations & other applications	Windows & Doors to bricks & blocks (outside) *	●	●		●				●	●	●	●		
	Plasterable or under rendering *					●	●							
	Temporarily fixing AVCL to rafters					●	●			●				

* Necessity for primer application (Yes/No): see under material compatibility and recommended use
■ recommended to use primer - ● recommended and designed for - ● works out properly but not designed for

General Notes

Ordering, supply and delivery
DuPont™ Tyvek® membranes and accessories are supplied and technically serviced in the UK and are available through most local and national roofing and builders merchants.

Packaging and identification
Rolls of Tyvek® membranes are individually wrapped and contain a label bearing the Tyvek® grade (eg. Tyvek® Reflex), the company name, address and telephone number, together with fixing instructions. A printed overlap line is indicated on the top outersurface of the material together with a continuous identification legend: DuPont™ Tyvek®. This information is printed on the inner face of Tyvek® Reflex.

Damage
Whilst Tyvek® membranes are extremely durable there may be occasions when the membrane is damaged as a result of careless handling. Minor damage can be easily repaired with Tyvek® Acrylic Tape (single sided) applied either externally or internally or Tyvek® UV Facade should be repaired by using Tyvek® UV Facade Tape. Areas of the membrane that suffer extensive damage should be replaced, or covered with a Tyvek® patch. In this case the affected area should be covered entirely, taking care to lap the sheets correctly by a minimum 100mm horizontal laps/150mm vertical laps. Sealing the membrane can be achieved by using the appropriate Tyvek single-sided tape.

Fire
The products have similar properties in relation to other polyolefinic sheets. Tyvek® membranes will melt and shrink away from heat, but will burn in the presence of an ignition source. They will not give off any harmful gases.

Tyvek® membranes generally have Fire Classification E in accordance with EN 13501-1, with the following exceptions:

Tyvek® FireCurb®: Class B-s1,d0
AirGuard® A2 FR: A2-s1,d0

Insect attack
Tyvek® membranes will not encourage attack from insects, birds or vermin.

Compatibility
Tyvek® membranes are compatible with most materials associated with the construction process, including sand/ cement and lime rendering, silicone and bitumen. Fibre contraction within the membrane can sometimes occur when in contact with water or solvent based timber treatments, temporarily resulting in a loss of water resistance. This only applies to wet treatments which have been freshly applied or soaked (by rainfall). Sufficient time must be allowed for timber treatments to dry before the installation of the Tyvek® membrane.

Health and safety
In normal installation and usage Tyvek® membranes do not present a hazard under the COSHH regulations. Handling single rolls of Tyvek® does not present a risk of injury, provided recommended safe practices in lifting and handling are followed. As with paper, freshly cut edges can be sharp, but cutting the material does not produce hazardous dust. COSHH information in accordance with directive 93/112/EC is available on request.

Durability
Tyvek® membranes will retain their durability at temperatures down to –40°C and up to +100°C. Tyvek® membranes will have a service life similar to that of the building fabric which incorporates them, provided their exposure to direct sunlight does not exceed 4 months.

Technical Support
DuPont™ Tyvek® offer a high level of technical support to assist with detailed proposals or specifications that include Tyvek® membranes. Full technical back up includes:

Telephone helpline:
discuss details and solutions with one of our technical consultants

Written confirmation:
for assistance with Building Regulations applications, warranties, acceptance of proposals and suitability of applications Technical literature: Agrément certificates, technical brochures and COSHH information

Site assistance:
on-site technical liaison with one of our Regional Managers

Seminars:
guidance on Tyvek® applications, control of condensation, energy efficiency and legislative compliance.

Condensation Risk Analysis:
to demonstrate compliance with the Approved Documents of the Building Regulations, condensation risk assessments in accordance with BS5250: 2021 are available on request. (See following page)

For information, please call our Technical Support Department: **+44 (0) 117 452 9052/9053**

Questions & Answers

Re: Tyvek® Housewrap, Tyvek® StructureGuard™, Tyvek® UV Facade, Tyvek® Supro and Tyvek® Reflex.

Where does a Tyvek® breather membrane go?
In wall constructions, behind the external cladding / brickwork, etc.

What does a Tyvek® breather membrane do?
Tyvek® breather membranes provide protection to the structure and thermal insulation from external moisture and condensation. They also assist in achieving airtightness to reduce convective heat losses from the building if the joints are sealed.

Do the joints in Tyvek® breather membranes have to be sealed?
No, sealing is optional unless superior airtightness/water resistance is required.

Should there be a vented cavity / airspace on the outside of the Tyvek® membrane?
Yes, to allow vapour to escape to outside atmosphere. The cavity/airspace may be vented naturally through cladding/tile joints or ventilated with airbricks, vents, etc.

Can a Tyvek® membrane be installed directly behind cladding or render & lathe?
Yes, but the breathability of the membrane will be less effective. Please note, Tyvek® Reflex requires an air space to provide thermal benefits.

Can a Tyvek® membrane be installed behind continuous metal sheeting as the separation layer?
Yes: Tyvek® Supro
No, if Tyvek® Reflex is being used.

Can a Tyvek® breather membrane be left exposed prior to the external cladding being installed?
Yes, for 4 months, provided that the membrane is secured sufficiently to prevent wind damage.

Re: Tyvek® Reflex.
Why use Tyvek® Reflex?
As well as providing protection against external moisture, condensation and air infiltration Tyvek® Reflex considerably reduces the amount of heat that is lost by radiation.

Which way around should it be installed?
Tyvek® Reflex is installed so that the shiny silver side faces a cavity.

Re: Tyvek® Supro

Can Tyvek® Supro be used as the breather membrane in a wall system ?
Subject to fire resistance requirements, yes, Tyvek® Supro has all the attributes of a breathable membrane to EN13859. Its extra strength allows it to be surface applied or used in a ‘free spanning’ application (page 26).

What does Tyvek® Supro do in floor construction?
Tyvek® Supro will provide a support to insulation as well as providing protection against external moisture, condensation and air infiltration.

Re: DuPont™ Tyvek® AirGuard® Smart

What is DuPont™ Tyvek® AirGuard® Smart for?
DuPont™ Tyvek® AirGuard® Smart is a strong and lightweight flexible AVCL with variable vapour resistance, which means that its ability to resist the passage of water vapour varies according to the surrounding environment. DuPont™ Tyvek® AirGuard® Smart adapts to the presence of moisture by reducing its vapour resistance and thereby allowing the moisture to migrate back into the building interior. In this case the vapour resistance can be as low as 1 MNs/g (sd 0.2m). Conversely, when the structure is dry and the building moisture levels are stable DuPont™ Tyvek® AirGuard® Smart will perform as a traditional AVCL.

Re: DuPont™ AirGuard® Control

What is DuPont™ AirGuard® Control for?
DuPont™ AirGuard® Control is an internal air-barrier for installation behind plasterboard linings, etc. When all joints are taped it provides an airtight layer, reducing convective heat losses as well as providing limited vapour control.

Re: DuPont™ AirGuard® Reflective

What is DuPont™ AirGuard® Reflective for?
DuPont™ AirGuard® Reflective is a 100% airtight internal membrane for installation in pitched and flat roofs and as an effective airtight vapour control layer (AVCL) behind the dry-lining of all wall systems. When installed with a batten space DuPont™ AirGuard® Reflective will provide considerable thermal improvement to a roof or wall element. Using the product in conjunction with Tyvek® Reflex breather membrane will offer significant energy savings.

Re: DuPont™ AirGuard® A2FR

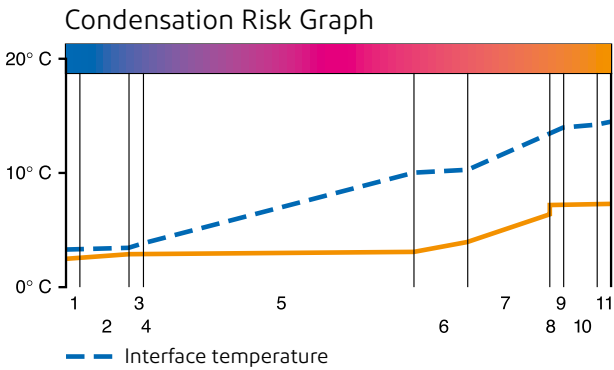
Can DuPont™ AirGuard® A2FR be used above 18m?
Yes, it can be used in all applications regardless of building height.



DuPont™ Tyvek® membranes wall and floor applications
(calculations for roofs also available)

Condensation Risk Analysis

In order to assess the risk of interstitial condensation a free analysis can be carried out for proposed wall or floor constructions where a Tyvek® membrane is specified. The analysis uses the calculation method contained in BS EN ISO 13788, and as referred to within Annex D of BS 5250: 2021.



To obtain the analysis please complete this form, scan and mail it to Tyvek® Technical Support on: tyvek.construction@dupont.com

Name & address:.....

Tel:

.....

Mob:

.....

E-mail:

Project ref:.....

Location:

Building type
(please tick **one** only)

☐ Office/shop
☐ Domestic/residential
☐ Public/community building
☐ Church
☐ School
☐ Sports/activity
☐ Swimming pool
☐ Other

Wall system
(please tick **one** only)

☐ Timber frame
☐ Metal frame
☐ Masonry
☐ Stone
☐ Internal insulation
☐ External insulation
☐ Brick/block
☐ Precast concrete
☐ Rainscreen cladding
☐ Other

Floor system
(please tick **one** only)

☐ Suspended timber
☐ Block and beam
☐ Concrete slab
☐ Other

Studs/joists =mm xmm @centres

Exposure rating (please specify) ☐ sheltered ☐ normal ☐ exposed

Construction details (please list construction build-up starting with the external layers)

Outside 1.....

2.....

3.....

4.....

5.....

6.....

7.....

8.....

Inside 9.....

Typical example:
102 mm brickwork
50 mm cavity
Tyvek® Reflex
11 mm OSB sheathing
140 mm insulation
DuPont™ AirGuard® Reflective vapour control layer
12.5mm plasterboard.

British & European Standards

BS 5534:2014+A2 2018	Slating and tiling for pitched roof and vertical cladding - Code of practice
BS 3177: 1959 (95)	Method for determining the permeability of flexible sheet materials used for packaging
BS EN 1107-2: 2001	Flexible sheets for water-proofing - Determination of dimensional stability plastic and rubber sheets for roof waterproofing
BS5250: 2021	Code of practice for control of condensation in buildings
BS 5268-2: 2002	Structural use of timber - Code of practice for permissible stress design, materials and workmanship
BS 5268-3: 2006	Structural use of timber - Code of practice for trussed rafter roofs
BS EN 13859-2: 2014	Flexible sheets for waterproofing - Definitions and characteristics of underlays - Underlays for walls
BS EN 13984: 2013	Flexible sheets for waterproofing. Plastic and rubber vapour control layers. Definitions and characteristics
BS 7374: 1990	Methods of test for water vapour transmission resistance of board materials used in buildings
BS 2782: Pt 3 1976 (96)	Methods of testing plastics: Mechanical properties. Methods 320A-320F. Tensile strength, elongation and elastic modulus
BS EN ISO 6946: 1997	Building components and building elements Thermal resistance and thermal transmittance – calculation method
Moat No.27: 1983	General Directive for the assessment of roof waterproofing systems
BS EN 13501-1:2018	Fire classification of construction products and building elements
BS EN 12114:2000	Thermal performance of buildings. Air permeability of building components and building elements. Laboratory test methods
EN ISO 12572:2016	Hygrothermal performance of building materials and products - Determination of water vapour transmission properties - Cup method

About DuPont



DuPont Luxembourg site

DuPont - 220 years of global innovations

DuPont (NYSE: DD) is a global innovation leader with technology-based materials and solutions that help transform industries and everyday life. Our employees apply diverse science and expertise to help customers advance their best ideas and deliver essential innovations in key markets including electronics, transportation, construction, water, healthcare and worker safety. More information about the company, its businesses and solutions can be found at www.dupont.com.

In the world of construction, DuPont developed Tyvek® over 60 years ago and has more than 40 years experience in the market with Tyvek® construction membranes, which are used extensively today in the protection of roofs and walls of millions of homes all over the world. Since its first installation, more than 15 million buildings have been protected with Tyvek® membranes worldwide. This shows that Tyvek® membranes have a well-established pedigree and are fit for purpose over the entire lifetime

of the building. As part of DuPont's company culture and core values of safety and protection, DuPont protects buildings and their occupants through the use of unique and highly advanced technological materials such as Tyvek®. At the same time, DuPont also protects the environment for future generations, as Tyvek® roofs and walls are extremely efficient - cutting energy consumption, heating bills and greenhouse gas emissions to the atmosphere, and thus reducing the risk of global warming.

With one of the best R&D capabilities in the world, DuPont has an outstanding track record as a strong and reliable manufacturer with a long standing commitment to sustainable growth, meeting the specific needs and requirements of all customers and contacts for all types of building.

DuPont and the circular economy

DuPont is using its innovative technology to enable a low-carbon and circular economy.

In 2020, we made strides in our ability to

upcycle byproduct from our production of Tyvek®, nylon and other high-performance synthetic fibres. We opened a new recycling factory at our Tyvek® production site in Luxembourg specifically to scale up our ability to advance circularity in our DuPont Safety business, and enacted new innovation-based partnerships with external partners and between our own DuPont businesses. As we improve our ability to innovate for circularity, we're continuing to pursue new beneficial uses of byproduct in our operations, while we improve our ability to avoid the generation of hazardous and non-hazardous waste.

The DuPont Sustainability Leadership Council is working to develop processes, collaborative workstreams and action plans that will allow us to aggregate, quantify and amplify our ability to enable a circular economy.

For greater details on our Sustainability goals and achievements please see our websites:

www.dupont.com

www.building.dupont.co.uk

Using Tyvek® and AirGuard®		
Always look for approvals from	Certified bodies	✓
Check that the data relates to	Aged performance	✓
Confirm the products are truly	Fit for purpose	✓



Certificate no: 90/2548 & 08/4548



Certificate no: 04.0157



ACKNOWLEDGMENT

Our global DuPont™ Tyvek® and DuPont™ AirGuard® team would like to thank the countless construction professionals, associations, certification organisations, training and testing centres, architects and designers, end users and other dedicated individuals for continuing to work with us to better understand and meet the needs of a changing market.

By working together, we can produce a safer and cleaner environment (internal and external), more efficient and comfortable buildings, better and safer living and working conditions and save precious resources today and for the future.

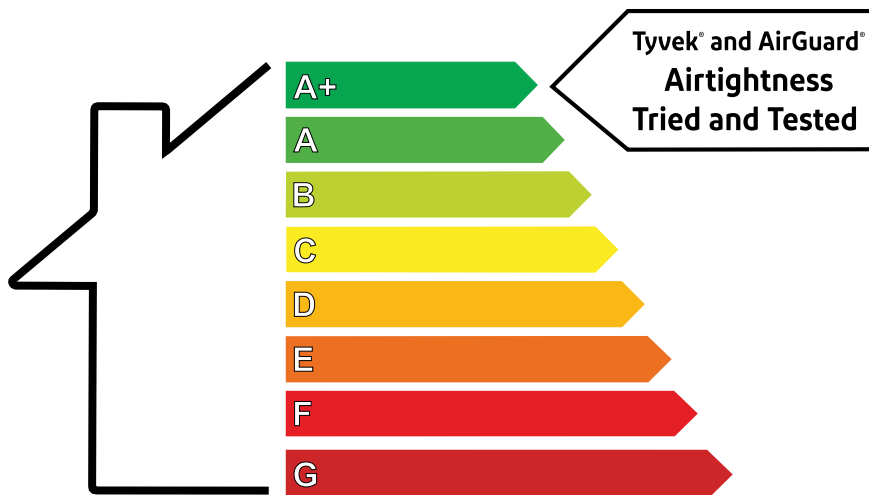
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